The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. I. DECEMBER 13, 1919 No. 26

Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- Abroad. Cheques, P.O.O.'s, and Postal Orders should be payable to Benn Brothers, Ltd.

Editorial & General Offices—8, *Bouverie Street, London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines)

Signs from America

IN our first issue we ventured to include, among a number of points demanding attention in this country, the steady advance of chemical industry in the United States. Recent events tend to emphasise rather than to weaken the need of the warning. Our leaders of industry are too much concerned about grave industrial problems at home to give full attention to developments abroad, and that menace to industrial peace—the labour leader educated just sufficiently to see his own point of view but incapable of appreciating the other points of view involved in international trade—can think of nothing but strikes for higher wages and shorter hours, when the need of every nation in the world is the restoration and development of production.

Two points selected from current reports from America are typical of commercial conditions over there which we cannot afford to ignore. In an address by Mr. J. W. O'Leary at the Exposition of Chemical Industries at Chicago, it was pointed out that the United States exports of chemicals increased in value from thirty million dollars in 1913 to nearly 200 million dollars in 1917. The higher prices charged explain a proportion of the increase, but beyond this the volume of goods exported is appreciably greater. During the war the U.S. Chemical Warfare Service was organised on a large scale, and while in this country the war work of British chemists is jealously guarded as a State secret, in America the results of experimental work and the lessons gained in works organisation have for months past been made public for the benefit of American chemical industry. Over there both the Government and the commercial class understand the meaning and value of publicity. In addition, the lavish scale on which research work is being endowed may be gathered from the description of the new laboratory building and equipment just opened at Pittsburgh, costing about a million dollars, while the tendency in this country is rather to curtail our expenditure on education. These movements are bound to tell, and it would be folly for the chemical industry of Great Britain not to take note of them.

The second point, equally important, though not touching so exclusively the chemical industry, is America's greatly increased interest in the world's great trade routes. Mr. Guy Emerson, the vice-president of the National Bank of Commerce, has just reminded us that the United States now stands in a definitely more favourable position in relation to international commerce than it did in 1914. "Our merchant fleet," he says, "is the second largest in the world. The Panama Canal is now effecting changes in trade routes which are highly favourable both to our importers and exporters and the unsettlement in methods of distribution during the war promises to emphasise the effect of this new waterway on the distribution of Asiatic products; while our position between the Pacific and Atlantic Oceans should serve to secure us our fair share of advantages from the more remote results of the conflict. A number of countries whose goods reached us before the war only by transshipment from European ports now are trading with us by direct routes. Our coal resources enable us to influence trade routes markedly, and should the increasing use of oil fuel for ships cause coal to cease to be a dominant factor, our present position as producer of two-thirds of the world's petroleum will give us the same advantage. It seems probable that the most far-reaching effect of the war on ocean transportation will result from the destruction of steamship tonnage

which took place, and the consequent changes in the relative position of the chief shipowning and operating nations. At its beginning, the United Kingdom owned 41·6 per cent. of the world's sea-going tonnage, and the United States 4·5 per cent. Now the United Kingdom owns 34·3 per cent., and the United States 20·4 of the sea-going tonnage." With movements of this kind going on not only among our American friends, but also in Europe and in the Far East, the need for enterprise, organisation, publicity, collective trade loyalty, and every other quality that will help the progress of British chemical industry should hardly require to be stated.

The Production of Intermediates

We publish this week the views of one of the first authorities in the British dyestuffs industry on the vital problem of the manufacture of intermediate products. It may be remembered that at a recent meeting of the Oil and Colour Chemists' Association it was suggested that the production of intermediates instead of being concentrated in one or two very large works, might preferably be distributed over a larger number of manufacturers. This, of course, is an old problem in the organization of industry, and the only new aspect of it, in connection with the British dyestuffs industry, arises from the special circumstances which have to be taken into account and the ultimate end to be attained. Is the ultimate end the establishment of a great new key industry on such a basis as will make this country permanently independent of foreign dyestuffs supplies, or is it merely the temporary convenience of every little business that requires a few pounds of dyestuffs? If the latter, then let us forget all the lessons of the war, import what we want from anybody who can supply it, and —our immediate perils over—take no further thought for the morrow. If we are not prepared to gamble with the future in this way, then the only alternative is the building up of a natural dyestuffs industry of our own. That is the policy to which the Government of this country is committed, and it is the policy on which the organization of a home dyestuffs industry has been proceeding for some time.

But the job is decidedly a big one. It cannot be completed in one year or in two. Some temporary tax in the shape, perhaps, of shortage or even of slightly inferior quality for a time may have to be paid by the consumer in order to secure the ultimate national advantage which is the main end in view. That is where the people who are putting questions in Parliament concerning the British Dyestuffs Corporation, or growling in the trade about not being able to get this or that as easily as they got it before the war, fail so hopelessly in the sense of perspective. They exhibit at its best, or at its worst, the Britisher's right to grumble at anything done by his own country. During the war it was common to find any little mistake or imperfection magnified to appalling dimensions, while the miracles of organization accomplished in spite of all mistakes were quite overlooked. And so in connection with the building up of a British dyestuffs industry, any point of detail in which we fall short of perfection assumes false proportions which obscure the really wonderful progress which has actually been made. In these circumstances it is necessary to insist on the permanent national point of view concurrently with the immediate trade point of view, and keeping these two in mind the problem with which we started —whether the general advantage will best be secured by concentration of plant for the manufacture of intermediates in one or two big centres or by dispersal of plant over a number of small centres—looks much simpler. The authority whose views are quoted on another page shows, as we think pretty conclusively, the ultimate advantage to lie with the policy of concentration. One might go, indeed, a stage further, and claim with some confidence that it is the one and only policy which meets the needs—national and international—of the new situation created by the war.

Manufacture of Pure Naphthalene

During the war period there was a very urgent demand for pure naphthalene, the price of which at one time rose to £30 per ton. Since the cessation of hostilities, however, the demand for this product has fallen away considerably, and to-day the price stands at about £17 per ton for the pure variety, and at £5 per ton for crude salts. The manufacture of pure naphthalene is, however, of importance, particularly as there are only one or two plants for the purpose in England, the chief centres of production being France and Italy. For this reason the process of manufacture which was adopted by Mr. J. A. Davy at the coke-oven works at Crigglestone is of interest, for by a modification of the usual routine of tar distillation he seems to have devised a method whereby the pure product may be obtained direct from the crude substance. Mr. Davy described his process before the recent meeting of the Midland Section of the Coke Oven Managers' Association, and although he admitted that there were many difficulties to be overcome, he had won through in the long run. Naphthalene is present almost exclusively in the carbolic and light creosote oils, and these oils are washed for carbolic and cresylic acids before treatment for naphthalene removal, they are then cooled, drained off, and the solidified naphthalene salts are dug out and transferred to a melting tank. They are then distilled —the process being carried on until the distillate coming over contains too much oil of naphthalene to settle out. The distilled naphthalene is broken up by mechanical means and is fed into a hydraulic press, where it is subjected to a pressure of about 2 tons per square inch. The pressed product is transferred to a re-melting boiler, and is afterwards blown into a washer. Here it is washed with 6 per cent. by volume of D.O.V., agitated for an hour, and then allowed to stand. The acid is run off and the naphthalene is further washed with 4 per cent. of D.O.V. After this procedure caustic soda is added, and finally the product is treated with water which has been weighted with sodium sulphate, the latter being added so as to make the aqueous layer settle below the naphthalene. The washed product is re-distilled, when the charge yields about 80 per cent. of its weight as the pure product.

It is to be noted that the yield of the pure product amounts to from 40 to 45 per cent. of the weight of the crude salts. From the above description it will be gathered that the process is somewhat tedious, and, therefore, costly. With naphthalene at prevailing prices it would scarcely be a commercial proposition; but that the margin between profit and loss is decidedly narrow may be gathered from Mr. Davy's statement that he would be enabled to make the process pay if the price of pure naphthalene reached £19 per ton.

Nitrate and Labour Unrest

WE pointed out recently that conditions in the nitrate industry were undergoing improvement, and as a result of the demand for the product the majority of the oficinas which were closed during the war had hopes of an early resumption of work. Unfortunately, however, the labour situation in Chile is now very uncertain, for the wave of industrial unrest appears to have spread even to that country. The improved outlook raised a good deal of hope among holders of nitrate shares, but the market in these has been subject to a certain amount of hesitation and, if this fact may be taken as a criterion of the true position, it looks as if labour is once again going to be the stumbling block in what might otherwise be a record season. The Nitrate Producers' Association has raised the selling price to 10s. 6d. per quintal, the rise being attributed to the labour attitude and the difference in rate of exchange. A general strike is now in force on the railways which supply the nitrate areas, although great efforts are being made to deal with the situation so as to minimise the effect at this important season of the year.

At a recent meeting of the Taltal Railway Company it was announced that freightage rates would be raised by 10 per cent., which itself will affect the cost of nitrate; but more interesting still was the statement made by one of the Taltal Company's directors to the effect that synthetic nitrate is of very little use for agricultural purposes, and that producers of it could not possibly hope to compete with the natural article in the way of a fertiliser. In view of the source of this statement it can scarcely be disinterested and must be taken for what it is worth. We note, however, a growing tendency to disparage the synthetic article, and it might be as well if such statements were challenged and disproved by the publication of actual experience with fixed nitrogen when employed in agriculture.

Chemical Engineering Conference

THE Chemical Engineering Group of the Society of Chemical Industry may be congratulated on the excellent arrangements for the second conference of the group which is to be held in the Chemical Department of the Armstrong College, Newcastle, on Monday next. The general subject selected for discussion is "The Transport and Distribution of Liquids in Chemical Works," and it will be treated from various points of view. The programme includes Papers by R. A. Pelmore on "The Squeegee Positive Rotary Pump," W. Hayhurst on "The Pumping of Acids and other Corrosive Liquids," R. A. Stewart on "The Marclen Glandless Acid Pump," John Oliphant on "Pumping Acids by Compressed Air," N. A. Anfilogoff on "The Handling of Petroleum in Bulk at Thames Haven," and J. Arthur Reavell on "The Raising of Acids by the Kestner Patent Automatic Elevator." The Papers will be illustrated by diagrams, lantern slides and models. There will be an exhibition of modern plant suitable for general pumping work in chemical factories, and also of pumps designed for movement of corrosive liquids. Some novel types of pumps are expected to be shown. The Papers are intended to give the latest information and practice in the subjects treated, and to be of use and interest to all who have analogous problems to consider. There is every prospect of a good attendance and interesting discussions.

The Calendar

Dec.		
15	The Faraday Society: Annual General Meeting, 7.30 p.m.; Ordinary Meeting, 8 p.m.	Rooms of the Chemical Society, Burlington House, Piccadilly, W. 1.
15	Chemical Engineering Group (Society of Chemical Industry). Subject: "The Transport and Distribution of Liquids in Chemical Works."	Chemical Department, Armstrong College, N'castle-on-Tyne.
15	Royal Society of Arts: "Synthetic Drugs." J. H. Hewitt, D.Sc., F.R.S., 8 p.m.	John Street, Adelphi, W.C.
16	Sheffield Association of Metallurgists and Metallurgical Chemists. "Scientific Works Management." F. A. Hurst.	Royal Victoria Hotel Assembly Rooms, Sheffield.
16	"Disintegration."	College of Technology, Manchester.
16	Institution of Petroleum Technologists: "The Application of Liquid Fuel to Heavy Oil Engines," A. J. Wilson.	Royal Society of Arts, John Street, Adelphi, W.C.
17	Birmingham and Midland Institute. "High Tension Magnetos," G. B. Betteridge.	Birmingham.
17	Society of Chemical Industry (Newcastle Section): "The Theory of Gas Producer Reactions, with special reference to the rate of gasification."	Newcastle-on-Tyne.
18	Chemical Society: Lecture by Professor J. Walker, F.R.S.	Burlington House, Piccadilly, W. 1.
18	Sheffield Association of Metallurgists and Metallurgical Chemists. "Tungsten Distribution in Crucible Steel," by G. Batty.	Royal Victoria Hotel Assembly Rooms, Sheffield.
18	"Seed Crushing," by B. P. Flockton, M.I.M.E. (Manlove, Alliott & Co., Ltd.).	Manchester Municipal College of Technology.
19	Society of Dyers and Colourists (Manchester Section): "Some Observations on the Tinctorial Properties of the Anthrocyans."	Manchester.
19	Society of Chemical Industry (Liverpool Section): "The Mechanism of the Hydrogenation of Oils in the Presence of Finely-divided Nickel," R. Thomas.	Adelphi Hotel, Liverpool.
20	Chemical Society. Ordinary Scientific Meeting and Informal Meeting.	Burlington House, Piccadilly, W. 1.

The Value of Statistics in Chemical Works

Lessons from the Report of the Factories Branch

These notes have been specially written for THE CHEMICAL AGE *and indicate the lines upon which chemical manufacturers may apply the experience gained to their own and to national advantage. The value of flow sheets, statistical education and instruction, &c., is emphasised, and it is shown that scientific cost keeping pays a good dividend on the outlay incurred.*

THE extracts from the Report on the Statistical Work of the Factories Branch (Department of Explosives Supply), published in THE CHEMICAL AGE of November 8th and 15th, indicate the enormous amount of statistical work carried out in connection with the manufacture of explosives during the war. The report describes in detail a system of plant and cost records of a magnitude and complexity probably never before approached, but so clearly designed and so well set out as to be easily intelligible to all acquainted with the elements of chemical technology. The descriptions of the processes for which the records were employed certainly do not err in the direction of assuming too great a knowledge on the part of the reader, but they will be invaluable to those who wish to study the system without a previous acquaintance with the methods of explosives manufacture.

The system, which has obviously been co-ordinated and worked out as a whole, includes the use of (1) Daily plant sheets. (2) Weekly and monthly summary sheets. (3) Monthly flow sheets and abstracts, and (4) Monthly cost sheets. Its general features include (*a*) The selection of dates for monthly stocktaking in such a way that the month always consisted for record purposes of a whole number of weeks, every third month of five weeks and all the others of four weeks each. For this purpose Saturday was the day chosen on all the factories, but a day which suits the convenience of the wages section so that the wages week should agree with the plant record week could be chosen, according to the needs of a particular factory. (*b*) The adoption of a standard system of weights and measures throughout every factory, in the accountant's office, as well as in stores offices and on the plant. (*c*) The reduction of all quantities of acids and chemicals to 100 per cent. units, all amounts being expressed both as actual quantities and as 100 per cent. quantities. (*d*) The closest co-operation between the plant managers and the accountant's and stores offices in the preparation of the record and cost sheets. (*e*) The reconciliation each week and month of the plant figures with the stores ledgers. (*f*) The tabular and graphical presentment of cost analyses, and the distribution of these to all members of the staff in any way concerned in or responsible for plant and factory working. (*g*) Detailed examination in London and on the factories of the flow sheets and cost analysis summaries by all the responsible executive officers.

Of the value of the system to an executive department erecting and starting factories of such magnitude there can be no question. The private manufacturer, however, appreciative though he may be of its value under the conditions it was designed to meet, will certainly ask how such an elaborate and obviously expensive procedure can be turned to account in his own case. For his purpose, obviously, the system as set out is unsuited, and he is only concerned to see if any of its principles can be applied to his own particular conditions. As a rule, and especially in view of the great difficulties with which he is at present faced in every direction, he will have very little time or inclination to study it in the detail necessary to discover this. The value of the report, great though it is, might have been considerably increased had a section been added summarising the principles and indicating the lines on which they might be applied to the ordinary chemical works. What, then, are the particular features which might be adopted by any one of us anxious to test its uses for his own purposes? To determine this it will be necessary to consider in somewhat greater detail the elements which go to make up the system.

Daily Plant Sheets

The daily plant records have been designed in the first case to meet the needs both of the man in charge of the section and of his superiors to whom they were submitted. Samples of complete sets of plant sheets in use at Pembrey, Craigleith, Greetland and Queen's Ferry are given in the report, and these are worthy of study in detail. The data required for these sheets covered most of the important plant constants necessary for chemical control, such as temperatures, pressures, strengths of acids, compositions of gases, &c. Obviously, these must be determined regularly and at frequent intervals, and the necessity of filling in the sheets daily drew the attention of the man responsible to these factors. The records showed also all quantities of materials handled and consumed, together with the plant efficiencies, and a glance at these provided the section or works manager with all the information necessary to him. Undoubtedly, such sheets required time and attention, but this would be small in comparison with the time required actually to determine the various data. The manufacturer will be able to decide what are the figures and constants required in his own case, and will be careful to avoid overloading his staff with the determination of unnecessary data. He will draw up his sheets in such a way as to satisfy himself that the man in charge must determine regularly those data required for the proper control of his plant. This demands the employment of adequate trained chemical staff, a necessity which all of us have now realised. The close co-operation of the laboratory with the plant is also necessary if the best results are to be obtained, and the daily sheets must be drawn up with a clear realisation of the fact that they are to be used as a valuable means to efficiency both in plant operation and factory control.

Weekly and Monthly Summary Sheets

These were made up by a clerical staff, properly instructed in the general principles of the plants of which they handled the records, and working in co-operation with the various plant and section managers and the stores. They included as a rule no physical data, and were intended to keep factory and site superintendents and the London Headquarter Staff in close touch with the operation of the various sections. They showed the quantities of the materials handled and efficiencies, and fuel, water and power consumptions, &c. Generally the works manager would use these sheets for control purposes, referring only to the daily sheets when detailed information was required.

Monthly Flow Sheets and Abstracts

At the end of each factory month the record staff compiled monthly flow sheets, which were sent to London for examination and for circulation to all responsible officers, both in London and on the various factories. The use of flow sheets originated, we believe, in America, and they have been used in British industry to a relatively small extent only. These sheets show at a glance the materials consumed and handled in the manufacture of one unit of final product, and show exactly the duty to be performed and the loss incurred at each point of the process in respect of that unit. In the manufacture of T.N.T., for example, the sheet shows the amount of nitrate of soda and sulphuric acid to be handled at the retorts in respect of the total quantities of T.N.T. produced, the amount of mixed acid required and the materials from which it is blended, the amount of waste acid produced and its composition, the operation of the denitration and concentration plants, &c. All these quantities are shown both as actual and 100 per cent. amounts, and both for the total production of T.N.T. and in respect of one ton of product. Thus can be seen at a glance the whole working of the factory over the period, and the consumption of raw materials for one ton of product, and the working of each factory can be compared month by month and contrasted with the operations on other factories. The report contains a large number of flow sheets for the manufacture of the various explosives, and these constitute a most valuable feature.

The method of drawing up a flow sheet to meet his own particular case must, of course, be left to the individual manufacturer, but no difficulty will be experienced if the objects to be attained are born clearly in mind. The value of such a periodical presentment of operations need not be emphasised, and the discussion of such sheets with the works managers

A Sample Flow-Sheet from H.M. Factory, Craigleith

Showing T.N.T. Production for the Three Months, August 3—November 2, 1918. All Figures in Tons of 2,240 lbs.

1.	2.	3.	4.	5.	6.	7.	8.	9.
T.N.T. Made.	Toluene Consumed.	Fresh Acid Used.	Spent Acid Produced.	HNO_3 Consumed.	Nitrate of Soda Consumed.	H_2SO_4 Consumed.	Spent Acid to be Denitrated.	W.A. to be Concentrated as H_2SO_4. To be Delivered as H_2SO_4.
684·79	335·68	4009·03	3829·77	670·83	Crude in Bags 1051·19 $NaNO_3$ at Retorts 957·945	1195·126	3829·77	2686·84 2530·467
	Actual Toluene used 333·45 Decrease in Toluene content in stock of intermediate Nitro-bodies 2·23 335·68	Mixed Acid:		*Used in Nitration.*	Retorts working over Period	*A.* Used at Retorts ... 955·933	Denitrators working over Period.	Concentrators working over Period.
			% Tons.			*B.* Lost in Nitration H_2SO_4 in Fresh Acid *Less* H_2SO_4 in W.A. 83·12	Tons. H_2SO_4 / Tons. HNO_3	Charged:
		H_2SO_4 43·0 508·19	H_2SO_4 70·16 2686·83	*A.* T.N.A. in Fresh Acid, *Less* T.N.A. in Waste Acid ... 695·82	HNO_3 produced ... 681·89			Acid. % H_2SO_4
		HNO_3 52·3 619·22	HNO_3 5·36 205·27		Nitrate of Soda ... 1068·25 (Gross overall.)	*C.* Lost in Denitration (Col. 8) H_2SO_4 ... Nil.	Charged 2688·18 202·97	4000·39 66·67 2666·8
		H_2O 4·7 55·76	H_2O 24·48 937·67	*B.* Recovered at Fume Towers ... 46·54	$NaNO_3$ ... 973·96 (Retorts usage.)	*D.* Lost in Concentration 5·82% of 2686·84 (Cols. 4, 8 and 9) ... 156·373	Recovered 2681·18 183·48	
		100·0 1183·17	100·0 3829·77		H_2SO_4 ... 971·49		Loss ... — 19·49	
		Sulphuric Acid for Final Nitration:		A—B ... 649·28	Retorts efficiency, 94·5%.	Total H_2SO_4 consumed 1195·426	Loss % — 9·6	Recovered:
		% Tons.					To be sent to Denitrators (Col 4).	Acid. % H_2SO_4
		H_2SO_4 96·1 2261·76		*C.* Decrease in HNO_3 content in stock of intermediate Nitro-bodies 1·84	1 ton HNO_3 requires			2663·28 94·29 2511·44
		H_2O ... 3·9 91·55			Nitrate of soda 1·567		3829·77 tons W.A. containing H_2SO_4 2686·83 tons and HNO_3 205·27 tons.	Loss = 155·36 tons.
		100·0 2353·31		A—B+C ... 651·12	$NaNO_3$ ... 1·428		Loss of H_2SO_4 ... Nil	Loss % = 5·82%.
		Nitric Acid for Mononitration:		*D.* Denitration Loss ... 19·71	H_2SO_4 ... 1·425		Loss of HNO_3, 9·6% of 205·27 = 19·71 tons.	Loss in Concentration of Denitrated W.A. 5·82% of 2686·84 = 156·373.
		% Tons.		A—B+C+D 670·83	∴ 670·83 tons require:			
		HNO_3 59·7 281·87			Nitrate of Soda ... 1051·19			
		H_2O ... 40·3 190·68			$NaNO_3$ ... 957·945			
		100·0 472·55			H_2SO_4 ... 955·933			
1 ton T.N.T. requires	0·490	5·854	% Tons.	*A.* ... ... 1·016	Nitrate of soda 1·535 (Crude overall.)	*A.* ... ... 1·396	5·593	To be concentrated, 3·924
			H_2SO_4 70·16 3·924	*B.* ... ... 0·068		*B.* ... ... 0·121		To be delivered, 3·695.
			HNO_3 5·36 0·300	A—B ... 0·948		*C.* ... ... —		
			H_2O ... 24·48 1·369	*C.* ... ... 0·003	$NaNO_3$ ... 1·399 (At Retorts.)	*D.* ... ... 0·229		
			100·00 5·593	*D.* ... ... 0·029		1·746		
				A—B+C+D 0·980				

and the chemists, engineers and foremen responsible will generally be productive of useful results.

Abstracts of such flow sheets, showing the total production and the consumption of materials per unit of product month by month will also tend to make for continual improvement. They will show up all sources of loss, full consideration and discussion of which with all concerned should be encouraged. On many of the national factories, these summaries were chalked up month by month on central notice boards for the information of the staff and employees, and a valuable spirit of co-operation and of interest in the results of plant working was thus stimulated. It is within the knowledge of the writer that this procedure has been adopted since the war on various chemical and other factories, with the happiest results, interest in efficiency being sometimes stimulated by the payment of monthly bonuses on all improvements over a certain level. As in most cases the cost of raw material constitutes the largest part of the cost of the product, the improvement of efficiency at the expense of a small bonus results in an altogether disproportionate increase in gross profits. It is, of course, essential, to secure the best results, that the operatives as well as the staff should understand clearly the extent to which their own particular sections enter into the final efficiencies, and this can only be secured by a gradual system of education and instruction, every attempt at which, if carried out carefully, and in the right spirit, will help to improve the relations between employer, staff and employee on which so much depends.

Monthly Cost Sheets

On the national factories, the monthly flow sheets and summaries were passed to the accountant's department, checked against stores ledgers, and worked up. together with the wages and services charges, into the monthly cost sheet. A complete set of cost sheets for H.M. Factory, Gretna, is included in the report, and is at first sight a very formidable document, covering nearly fifty printed pages of foolscap. When it is remembered that cost sheets from some twenty factories were received, checked, and analysed in London each month, some idea may be obtained of the magnitude of the work of the Statistics Section. It should be pointed out, however, that the actual average cost of the monthly output at Gretna was approximately £500,000, and the actual cost of the statistical work involved was almost negligible on such a figure.

The private manufacturer, in co-operation with his accountant, will probably be able to draw up three or four sheets which will give him all the information he requires. It must be emphasised, however, as pointed out in the report, that "The entire secret of successful cost analysis depends upon dividing each manufacture into a number of separate processes, and showing clearly the efficiencies and costs of each of these." In some cost systems all operations are regarded simply as a debit on the cost of the product, and the effect of loss and inefficiency at separate points is obscured instead of being clearly brought out and emphasised. Successful cost analysis must show clearly the incidence of every operation and of every charge throughout the entire factory on the final cost of the product. The results of the analysis are best expressed by means of graphs, which should be presented to the works manager and to the manufacturer himself, and by them discussed with the staff, in order that every man on whose work the conduct of the factory to any degree depends may have a clear idea of the £ s. d. value of the materials he is handling, and of the meaning in terms of money of all efficiencies and charges for which he is responsible.

General Conclusions

To modify an existing system, or to bring into operation a new system, on the lines adopted throughout the National Factories, will usually require a very considerable amount of time and care. Once inaugurated, however, such a system should not prove difficult to work, and the actual cost of the accounting and clerical staff required, if proper arrangements are made for the co-ordination and instruction of all concerned, should prove very small in comparison with the value of the output. Manufacturers in this country have generally, and with reason, been critical of Government control and Government methods. The system of the Explosives Department, however, speaks for itself and cannot certainly be considered as in any way elaborate or expensive in view of the enormous value of the material produced.

Protecting Metals from Oxidation at High Temperatures

A NEW process now being commercialised by an American Corporation for the preventing of oxidation of various metals at high temperatures is causing considerable comment among metal users and mechanical executives of large industrial plants. This process is known as calorising, and has been worked out in accordance with the well-known fact that aluminium oxide is extremely resistant to heat.

In the process of calorising, the parts to be treated are packed in retorts with an alumina mixture and certain chemical elements; hydrogen gas is introduced into the retort, which is then revolved and gradually brought up to 1,650°F. in the furnace. After holding the heat at this point for a proper interval, the retort is allowed to cool slowly with the introduction of the hydrogen still continuing, and when cold the parts are withdrawn and cleaned. The penetration of the alumina has been accomplished into the surface metal of the parts, to a greater or less degree depending upon the time the process is allowed to operate, and forms a protective homogeneous alloy with the surface metal of the parts treated.

The General Electric Company (U.S.A.) had long recognised the need for better protection from oxidation of the various heating elements which it manufactured, and set its research laboratories at work to evolve and develop some process of treatment which would afford more heat resistance to metals. After extensive and intensive experiments, the process of calorising was determined, and was incorporated in many products of the General Electric Co. with very satisfactory results. About three years ago the Diamond Power Specialty Company of Detroit, manufacturers of mechanical soot blowers for boilers, began to interest themselves in a method of protection for their blower elements which were exposed to hard and continuous service in temperatures in boilers, which temperatures at times reach a high maximum. In their investigation they tried calorising, and found that this process gave a very much increased life to the blower parts exposed to these high temperatures. All of this firm's blowers are now equipped with calorised parts as a special feature of their construction.

The process had by this time received such a comprehensive test that the possibilities of commercialising it began to be considered, and the Calorising Corporation of America was formed at Detroit, Mich., and began immediately the construction of a plant and equipment to handle the calorising of metal parts commercially. Over $100,000 has been expended in developing the proper character of furnaces, retorts, mixtures and handling, and the development of the calorising process has been brought to a high point of efficient application. During the past two years thousands of parts have been calorised for many of the largest industries of the country, and the Detroit plant has been visited by many eminent chemists and metallurgists. Experts generally predict a large use for calorising among industries experiencing heat oxidation problems.

Where high temperatures in combustion ranging up to 1,800°F. are experienced, calorised metal is said to give most excellent results. The ideal temperature for its use range from 1,100 to 1,750°F., and at 1,800 deg. the resistance to oxidation from heat very slowly diminishes. Close-grained cast iron, black and wrought iron, steel, nickel, nickel-steel, brass, bronze and copper have been very sucessfully calorised, and a much longer life incorporated in their use in high temperatures. A large application is seen in relation to calorising of annealing and carbonising boxes, pyrometer protection tubes, retorts, super-heaters, vaporisers, burner collars, pipe and tubing, and a multitude of other uses among many industries. Calorising is not a preventive of atmospheric oxidation or oxidation from moisture. It has wonderful resistance however, to oxidation from heat up to 1,800°F., and assures a much less frequent replacing of equipment or machine parts, with elimination of the considerable labour cost involved and loss of production resulting from laying-up of equipment. Calorising may be classed as one of the big accomplishments of industrial science, for which a large and attractive field exists in England and Europe, where the process will be sublicensed to responsible firms by the Calorising Corporation of America.

British Intermediate Products and Dyestuffs

The Case for Centralised Large-Scale Production

IN THE CHEMICAL AGE of November 22 attention was drawn to suggestions made at a meeting of the Oil and Colour Chemists' Association that the production of intermediate products for the manufacture of dyestuffs might with advantage be more widely distributed, and that the larger gas companies might themselves carry their crude products on to the intermediate stage, and place their own intermediates on the market for the use of any firms desiring to take up the manufacture of dyestuffs.

This point is one of vital interest to the future of the British Dyestuffs industry, and raises a central principle of national policy. It offers a choice of two quite different systems—on the one side the organisation of the British dyestuffs industry on the large-scale centralised plan which gave Germany practically a monopoly of the world's dyestuffs supplies; on the other, the distribution of the industry over a much larger number of firms, big and small, running their businesses on different lines and adopting their own different processes. In other words, the question to be decided is whether the dyestuffs' industry is to be treated as a national interest of vital importance to the whole country and, indeed, to the Empire, or as a mere domestic question, to be decided by the wishes of this or that individual firm, without regard to the larger national outlook.

The British Position Explained

We are able to publish this week an important statement on this subject from one of the first authorities on the British dyestuffs industry. In the statement which follows the matter is discussed from the national point of view, and some account is given of the wonderful progress which has recently been made in the organisation of this key industry on a national basis.

"We take the view," our informant states, "that intermediate products have got to be produced on a large scale for the simple reason that they are consumed on a large scale. For example, supposing that an intermediate product is consumed in Great Britain to the extent of 1,000 tons per annum, clearly the most efficient way of producing it is by constructing a plant and organisation of correspondingly large size. It is obviously far better and more economical to produce the thousand tons in one plant than in ten lots of one hundred tons each. There are a number of intermediate products of that order of importance, and, of course, if you manufacture intermediates on that large scale, with all those accessories of machinery and personnel which a large plant requires, you are naturally going to get the highest possible manufacturing efficiency.

"Further, these intermediate products are to be regarded, not as independent entities, but as members of a great group or groups or sections of groups, one member of a group being dependent for its manufacture on another member of the same group or even of another group. That means, generally speaking, that you can only produce efficiently if you have available all the members of all the groups in one establishment.

"Another point is that intermediate products are not made for the fun of making them. They are made to be put into dyestuffs manufacture. Clearly, then, it is an advantage to be able to make your intermediate products at the place where you are going to make your dyestuffs. For if you manufacture intermediate products in small quantities, produced in different places by different people and, perhaps, by different processes and methods, they have all to be collected together at one place for the manufacture of colours, and allowance must be made for possible differences in the quality of the products. In such conditions the intermediate products would have to be isolated, packed, transported, unpacked, put into solution, and then used, whereas if they are made in the place where the dyes are to be made you save all this trouble in handling, and you can at once guarantee a uniform quality for all the products delivered to the dye-manufacturing departments. In a great many cases there would be no necessity to isolate the intermediate products; they could be used directly in manufacture as produced in a state of solution.

"What I have said applies to the vast bulk of intermediate products. It may be true that there are a few special substances, such, for example, as derivatives of phenol, which might conveniently be made by some firm specialising in that particular base product, but even then it would be necessary for the firm to operate on a large scale. Therefore, in order to reach the highest standard of manufacturing efficiency, in order to make the best possible use of the relations which exist between one intermediate product and many others, in order to eliminate as far as possible the isolation of materials and the cost and difficulty of transport, in order, finally, to secure uniformity in the quality of dyestuffs, it seems essential that, as far as possible, the whole manufacture should be included in the operations of one single works.

Germany's Pre-war Policy

"There is no doubt that the general policy of the German manufacturers, as far as was desirable, was to have available in their own works supplies of intermediate products of their own manufacture, and in that way their industry was made complete and self-dependent.

"This question of the production of intermediate products is the key to the whole situation of the British dyestuffs industry. You may have all the raw materials in the world and all the dye making plant, but if you have not the plant for making intermediate products it is absolutely useless. The manufacture of the intermediate products is absolutely essential. The Germans concentrated on this particular phase of production. They took steps before the war to complete their monopoly of the supplies of dyestuffs by securing a monopoly of the intermediate products. At a shot I should say that 96 per cent. of the intermediate products made in the world before the war was made in Germany, and that gave them the key to the situation. We have always insisted that the British dyestuffs industry can never be successful until we have seized that key completely. We have now established colossal plants, and whereas the manufacture of intermediates in Great Britain for dye making before the war could be measured by tons per week, to-day it is measured by scores of tons per day. When the manufacture of intermediate products has once been firmly established in Great Britain we shall have broken the back of the problem. We already have the raw materials, and when we have completed our plant and organisation for the manufacture of an adequate supply of intermediates the making of the dyestuffs from those intermediate products will be one of the relatively easy phases of the business.

"As an example of the progress already made in the short time we have been at work, take the case of vat colours, which are very fast to light. The Germans laughed at the idea of our undertaking the task of manufacturing these colours, and if my memory is correct one German authority predicted that we could not do it in ten years. The fact is that we have actually started to produce these colours—indanthrene blue may be mentioned as an example—so that what the Germans said could not be done in this country in ten years has actually been accomplished in about as many months. With the proper research organisation and patience there is really no chemical secret in these German products. What does happen is that in the process of production little working "tips" are picked up from time to time. These, of course, come with experience, and are in no sense chemical secrets, and as our experience expands and lengthens so our methods of production will get nearer and nearer perfection."

"QUANTITATIVE ANALYSIS."—Our reviewer writes: "In my review of the book on Quantitative Chemical Analysis, published in THE CHEMICAL AGE, of Saturday, December 6, the printer has twice altered the word colorimetric to calorimetric. The tests to which references were made are colour tests—not heat tests."

The Oil Seed Crushing Industry

Paper by Mr. J. W. Pearson

BEFORE the Royal Society of Arts on Wednesday, December 3, Mr. J. W. Pearson, chairman and managing director of the British Oil and Cake Mills, Ltd., read a paper on the oil seed crushing industry. Lord Lamington was in the Chair.

Mr. Pearson said that the earliest centre in Europe where seed crushing was an established industry was Holland. The first authentic records of any oil factory in England dated back to the seventeenth century and related to a business at Evesham (now belonging to Messrs. Foster Brothers), and by the middle of the eighteenth century the industry had acquired considerable importance. The chief manufacturing centre in England had always been Hull, where the principal seeds crushed were the product of districts abutting upon the Baltic Sea.

While the early trade was mostly centred at Hull, London and Liverpool, there had been a gradual extension, and factories of considerable importance had sprung up at Aberdeen, Bristol, Glasgow, Dundee, Leith, Lincoln, Lynn, Southampton, Warrington, Weybridge, Burntisland, Bridgwater, Gloucester, Grimsby and other places.

The paper was divided into three parts and dealt with materials, plant, and products.

Materials

With regard to materials, the first known source of oil was the oil of olive or coco-nut, and it was not until the sixteenth or seventeenth century that it became generally recognised that many other vegetable seeds and fruits might be used for the production of oils. Oil seeds might be classified into those that were rich and those that were poor in oil. Those rich in oil included ground-nuts, sesame, castor, mowrah, copra, palm kernels, the three former producing liquid oils, and the three latter solid oils. The group less rich in oil—containing less than 45 per cent.—comprised linseed, cottonseed, nigerseed, poppyseed, rapeseed and soya, all of which produced liquid oils. The claim to regard the oil seed trade as one of the key industries of the country was surely established when due regard was given to the huge quantities of oil required by the manufacturers of soap, paint, linoleum, varnish, lubricants and burning oils, among the technical trades, and for baking, frying, cooking fat and margarine manufacturers among the edible trades. The total consumption of oils for these purposes in Great Britain was estimated at 600,000 tons per annum.

The business of importing oil seeds was generally regarded as a separate trade, and special organisations had been set up to weigh and sample the consignments on arrival, and this system of purchase on analysis had undoubtedly contributed largely to the general improvement in both quality and condition of the merchandise brought to this country.

Plant

Dealing with the plant used in the industry, the author traced the early methods and described how the first hydraulic press manufactured in the year 1830 by the French engineer Chambaunet, followed the patent of 1795 granted to an English engineer named Joseph Bramah. Within a few years the use of accumulators for the distribution of pressure was discovered by the Lyonese engineer Falquiere, and no doubt that system of hydraulic pressing caused the enormous and rapid spread of the industry all over the world.

Another process which had come much into favour in recent years was that of chemical extraction. This was simply the application on a commercial scale of the same principles that were adopted in the laboratory for the extraction of oil from oil seeds when making an estimation of the contents. In comparing the manufacturing costs of the two systems, the principal standing charges might be regarded as much the same for both, but while there was in favour of the extraction process a slight saving owing to the fact that no pressbagging was used, there was a much greater coal consumption and a heavy additional charge owing to the loss of solvent, which was perhaps the most expensive idea of the system. In pre-war days it was generally reckoned that the total manufacturing costs under the extraction process were at least 50 per cent. greater than those under the hydraulic system.

Handling the Products

It was in handling the products of the mills that the greatest improvements had been made in recent years. The most important developments were in connection with edible oil refineries. The earliest refiners confined their attention to the production of clear oil suitable for the manufacture of soap, and the main object was the removal of colour. This was usually done by subjecting the oil to a treatment of caustic soda or weak acid, after which filtration through an ordinary filter press completed the process. Oils intended to be used for edible purposes were at first treated in a very casual manner, and for many years the only refining process used in England was the application of weak caustic soda for the purpose of neutralising the free fatty acids in the crude oil, followed by a steam and water wash and filtration over fuller's-earth. This produced an oil which was used for fish trying and ordinary cooking purposes. The development of refining plants made more rapid progress in North Europe where the use of oil for edible purposes was so much more general than in England. The war had had a very marked effect on the consumption of margarine in England; to-day it was more than three times what it was before the war, and the margarine manufacturing plants were capable of producing over 10,000 tons of margarine per week, whereas not more than 2,000 tons were produced before the war. Refineries had sprung up in different manufacturing centres, especially designed to produce what was known as deodorised oil.

Cottonseed Oil

Perhaps the most fascinating of all the oils was that obtained from cotton seed on account of the multiplicity of its sub-products. Here the crude oil was a darkish blackish colour tinged with red. It combined readily with caustic soda, and was therefore removed in the same process as the neutralisation of the fatty acids. In the case of most crude oils subjected to this process, the residue was a semi-soap commercially known as soap stock, and was an article readily brought by soap makers. Cotton oil residue, however, containing the whole of the colouring matter was quite useless for the manufacture of soap, and up to 50 years ago was regarded as a waste product. To-day it had a high value, and was subject to a special process of distillation at a high temperature over a current of superheated steam. The fatty matters were distilled over as a light-coloured grease, and the residue left behind as a black pitch. The constitution of this pitch could be varied in the course of the distillation process and turned out either as a hard brittle pitch, used for the manufacture of the coarse waterproof wrapping in which cotton goods were exported, also for railway covers, black varnishes, &c., or again as a rubber pitch or an elastic pitch used in the manufacture of cheap rubber substitutes and as an insulating material in electrical work. This grease was distilled over again several times, each operation raising the melting point of the fatty acids, thus producing fine white grease suitable for soap and candle makers. It could also be pressed in hydraulic presses, turning out on the one hand fine oleins, and on the other, hard white stearine cake, valuable for the manufacture of soap or candles. Thus every ingredient of a once waste product was now turned to useful account.

Probably, however, the most interesting process of recent date was that known as the hardening or hydrogenating process which enabled most liquid oils to be turned into a solid substance almost indistinguishable from tallow, and relied in its operation upon a purely chemical change.

Oil Cakes for Cattle Feeding

Another product of seed crushing was the residue or cake so largely used for cattle feeding. By far the most popular cake in England was linseed cake. For dairy purposes ground nut cake and coco-nut cake had become popular, whilst a trade round which much interest centred was that of the production of cottonseed cake. Up to the outbreak of the war the seed crushing industry was carried on in this country principally for the sake of the cake production. The last five years had brought about a substantial change in the English industry. Numbers of the new plants had been erected whose major object was the production of oil, particularly for edible purposes and margarine manufacture, and this should mean a general expansion of trade.

Discussion

Dr. J. A. Voelcker, in the course of the discussion, said it was not quite correct to say that oil seeds were not given in England as there were fairly considerable quantities of linseed, which had been encouraged by the Board of Agriculture, as well as mustard and sunflower. He was not sure that the present tendency to use the richer oil bearing seeds for the purpose of the manufacture of edible oils was not a bad thing for the farmer, because it meant that he was getting less and less oil in his cattle cake.

Mr. Lloyd (Consulting Chemist to the British Dairy Farmers' Association) said the tendency to-day in the manufacture of oil cake for cattle was to decrease the oil and increase the albumenoids, but the albumenoids were undigested by the animals and so were wasted. If the oil seed industry wanted to succeed in this country, not only in the supply of oils, but also in the supply of food for cattle, which would have the maximum value for feeding purposes, it must endeavour to make softer cake with a larger percentage of oil.

Mr. McIlwaine, of the Hull Oil Company, said he had been extracting oil for the last 37 years by the so-called chemical process, which was not a chemical process but a physical process, dissolving out by benzoline, and he had discovered that the steam in the second part of the process destroyed the moist ingredients in nearly all the seeds, and certainly in castor. At the same time there was such a prejudice against the very name of castor that there had been a great difficulty in being able to dispose of any of the residue in the form of cake, and he had given it up after a serious trial, before the war. Since then, however, owing to the shortage of feeding stuffs, it had become more popular, and he had delivered as much as between 1,000 and 2,000 tons in a single instance. With regard to the point that this country had been backward in the matter of edible oils, one important reason why we were beaten by Germany was that the German Government before the war put on an import tax of £10 per ton on palm kernel, and he believed on all solid—certainly on all edible—oils, and the result was that although the oil industry flourished the unfortunate German people had to pay £10 per ton too much for the oils they consumed. Without that tax we should have had no difficulty in competing. This was the present position, and if the German Government again attempted to impose such an import tax upon oil going into that country in order to assist her foreign trade, then he suggested that we should put on a counter-vailing tax on all seeds exported from West Africa and other parts of the British Empire.

Society of Public Analysts

AN ordinary meeting was held at the Chemical Society's Rooms, Burlington House, on December 3, Dr. Samuel Rideal, President, in the Chair.

A Certificate was read for the first time in favour of :—Mr. William John Read, M.Sc., F.I.C.

Certificates were read for the second time in favour of :—Messrs. Percy Ewart Bowles, F.I.C., Ph.D. (Heidelburg); Charles Crowther, M.A. (Oxon.), Ph.D. (Leipsic) ; John William Hawley, B.Sc. (Lond.), A.I.C. ; Ernest Joseph Lush, B.A. (Cantab.), A.I.C. ; H. Percy Marks, B.Sc., A.I.C. ; Robert Selby Morrell, M.A. (Cantab.), Ph.D. (Wurzburg), F.I.C.

The following were elected Members of the Society :—Messrs. William Norman Leng, John Dalton.

Papers were read on " New Distillation Method for Detecting Adulteration in Butter and for Estimating Fats of the Coconut Group," by George van B. Gilmour, A.I.C., and on " A New Process for the Determination of Arsenic ; with Notes on the Chemistry of the Marsh-Berzelius Process," by B. S. Evans, M.C., B.Sc., F.I.C.

The new distillation method for detecting adulteration in butter, Mr Gilmour said, consisted in the separation of the volatile acids into two groups, depending on their solubility or insolubility in saturated brine (NaCl). Results were given for the application of the method to the distillate from the Blichfeldt apparatus. These results indicated that the composition of a fatty mixture deduced in this manner was more reliable and more rapidly obtained than by the combination of the Reichert-Meissl-Polenske-Kirschner Method.

In the second paper Mr. Evans pointed out that arseniuretted hydrogen evolved by deduction with zinc and sulphuric acid was decomposed by ignited copper. The increased weight of copper was divided by a factor which was discussed. The necessity was shown for the absence of heavy metals. The retention of arsenic in the Marsh-Berzelius test was considered to be due to (*a*) metallic arsenide, (*b*) arsenic. The author also puts forward an explanation of Chapman's modification using cadmium.

Belgium's Chemical Industry

THERE were 27 chemical factories in Belgium before the war, and of these only seven were left undisturbed during the German occupation ; the remainder was despoiled of most of the equipment material. A number of associations have been formed with a view to securing supplies of raw materials, and these have amalgamated under the title of " Féderation des Industries Chimiques de Belgique." Considerable difficulties are being experienced in the matter of sales. There is little home demand, the market being flooded with foreign products, among which are cheap German goods introduced through Belgian agents. A demand is arising for the prohibition of free imports, and for imports to be granted only to trade associations. Great difficulty is being experienced in regard to exports. Prior to the war Germany was one of Belgium's most important markets, particularly for sulphuric acid, and it is considered that Germany should be made to purchase at least 200,000 tons of Belgian sulphuric acid annually.

The following information regarding the present position of the Belgian chemical industry has been issued by the Comité Central Industriel. There is very little activity in the soda and potash industry. The output of acids amounts to only about 20 per cent. of the pre-war normal. The manufacture of artificial fertilisers is suffering from the lack of mineral phosphate. The dye industry is at a standstill owing to shortage of raw materials. The tar-distilling industry is credited with very little production on account of the small number of coke ovens in operation. There is little doing in the wood-distillation industry owing to lack of timber. The manufacture of explosives is being taken in hand. The match industry is being carried on, but is hampered by the high import duties in foreign countries. In general, there is no activity in the fat and grease industry. The mineral oil industry suffers owing to the high cost of raw materials. The soap industry has restarted operations, but only on a very limited scale. The glue and gelatin works at Hasselt resumed work in May, but the output is only one-third of that of 1914. The two oldest Belgian chemical firms, the Produits Chimiques d'Aiseau, the Produits Chimiques de Moustier and the Société de Superphosphate et Guano, have gone into liquidation, and will be taken over by a new company with a capital of 5,000,000 francs.

The World's Shortage of Phosphate

SINCE the outbreak of the war, in August, 1914, the world's production of phosphate rock has not been normal. Production in the United States in 1913 was 3,161,145 metric tons, but in 1917 this amount had fallen to 2,625,000 tons, and comparing the production of all the 17 countries where phosphate is produced, for 1913 and 1917 we find that there was a decrease of about 54 per cent. Production in the United States declined each year following the outbreak of the war until 1917, when there was a marked increase. Production in Tunis (the second largest producer in the world) dropped in 1914 and 1915, increased slightly in 1916, to be followed by a sharp decline in 1917. Taking the year 1913 as a basis, and assuming that production was not greater in 1918 than in 1917, which seems to be conservative, the total amount of phosphate necessary to make up the shortage which has been occurring in all countries since 1913 amounts to about 15 million tons. It is important to remember also, that while basic slag as a source of phosphate must be considered, yet the basic slag industry, in spite of a largely increased steel business in Great Britain due to the war, did not increase apidly enough to offset the decrease in importation of natural phosphate. The United States is, of course, the largest producer of natural phosphate, and it is calculated that the United States export business in phosphate during the war was 5,000,000 tons less than it would have been in normal years. The United States Government's special commission, sent to Europe in 1918 to investigate agricultural conditions, report a big demand for fertiliser in Europe, and the United States Shipping Board is now co-operating with the producers of phosphate in the United States to develop the export business. In Canada the production of natural phosphate has fallen off in recent years, due largely to the development of the United States deposits. There are certainly important deposits of phosphate in Eastern Ontario and Western and Southern Quebec. Only a small amount is now being taken from the grounds. This is manufactured at Buckingham, Quebec, partly into phosphorus by the Electric Reduction Company, and partly into fertiliser by the Capelton Fertiliser Company, also at Buckingham. In fertiliser manufacturing, phosphate rock (natural phosphate) is pounded and then treated with sulphuric acid, giving acid phosphate. Phosphorus is manufactured from phosphate rock by a process of reduction in an electric furnace. It can also be obtained from the acid phosphate

The Glass Industry

Developments in the Midlands

MR. W. BRADFORD, general financial secretary of the National Flint Glass Makers' Society, presiding at a meeting of the members of the union at Dudley, on Saturday, December 6, stated that owing to the competition of foreign manufacturers the glass trade before the war was approaching extinction.

It was estimated that about 60,000,000 tumblers and 20,000,000 pieces of stem table ware were required. Mr. Bradford frankly admitted that at present, English manufacturers could not produce anything approaching the total requirements of the nation. The number of employees in the industry had, however, considerably increased, and very soon there would be a marked expansion of the output. The removal, as from September 1 last, of all restrictions on imports of table and decorative glass had had a most unfortunate effect on manufacturers. Those who had already extended their plant were unsettled, and other manufacturers who were awaiting the announcement of the Government's policy before embarking further capital were now discouraged from steps which they would otherwise have taken.

Before the war, with the exception of two firms manufacturing electric lamps, practically no electric lamp bulbs were produced in England. The development of the trade was such that now upwards of 1,000,000 bulbs per week, together with the necessary tubing and rod, were being produced and the Board of Trade had stated within the last few days that the requirements of the country were being fully met by home manufacturers. Several plants were being installed which would, if necessary, greatly increase the weekly production and there was no doubt that manufacturers could amply meet both home requirements and the requirements of all the export trade they could secure. It would be a catastrophe if the employment which this new industry provided for some thousands of people was jeopardised by the unfair competition of foreigners receiving incomparably lower wages and working under much less satisfactory conditions.

With regard to lamp chimneys, these were, before the war, largely imported; now English manufacturers were taking up their production in large quantities and it was anticipated that within the next six months the production would be increased by at least 100,000 per week. In regard to scientific glassware and essential illuminating glassware (in which during the war the chemist had played a great part) both manufacturers and workers had demanded that importation should be strictly limited until time had permitted the development of productive capacity sufficient to enable them to take care of their former trade. The development of this section of the trade, which should take place very rapidly, should provide healthy and well-paid employment for considerable numbers of skilled and unskilled men and women.

Efforts were now being made to secure protection of the general glass trade, and Mr. Neville Chamberlain had consented to state the case for the table glassware when the matter came before the House of Commons. The prospects of the trade were never so bright as at present, but if the existing satisfactory position was to be maintained, and future developments secured, every effort must be made by those employed in the industry largely to increase the production. Financiers were willing to put money into the trade, and one had offered £10,000 to put down a plant at Dudley if the men to work it could be found.

Obituary

COLONEL W. L. PILKINGTON.—The death took place on Monday of Colonel William Lee Pilkington, head of the firm of Messrs. Pilkington Brothers, glass manufacturers, St. Helens. Colonel Pilkington, who was 62 years of age, was the eldest son of the late Mr. William Pilkington, of Roby Hall. He was the chairman of the St. Helens Conservative Registration Association, and was an active supporter of the late Sir Henry Seton-Karr during the period of 29 years that he represented St. Helens in Parliament. He was lord of the manor of Sutton, St. Helens, and was a generous contributor to the church in the township. Colonel Pilkington was also a deputy Lieutenant of the county of Lancaster and a county and borough magistrate for St. Helens. Up to a few years ago he took a prominent part in directing the control of the great glass firm. His favourite sport was polo, and he used to have a very fine stud of ponies.

London University: Honours in Chemistry

THE recently published Honours list of the University of London includes the following successes in chemistry:—

B.SC. EXAMINATION FOR INTERNAL STUDENTS.

Class I.—Birch, Stanley F., R. Coll. of Sci.; Doubleday, I. M., R. Holloway Coll.; Dunnill, Sydney, Verschoyle, Terence, T. H., and Wigginton, Reginald, R. Coll. of Sci.

Class II.—Cant, Herbert J., E. Lond. Coll.; Cook, James W., Univ. Coll.; Diamond, Claude, Birkbeck Coll.; Dowsett, Grace L., E. Lond. Coll.; Drummond, R. Bedford Coll.; Filmer, Helen A., E. Lond. Coll.; Huntingford, Donald B., E. Lond. Coll.; Mann, Frederick G., Battersea Polytechnic; Phillips, Henry, Univ. Coll.; Weston, Arnold, King's Coll.

Class III.—Baron, L. V., Bedford Coll.; Browning, Harold S., Battersea Polytech. and West Ham Mun. Tech. I.; Carlton, Margaret, Birkbeck Coll.; Cook, Sheila D., Univ. Coll.; Craven, Reginald, R. Coll. of Sci.; Griffiths, M. E., Bedford Coll.; Lancaster, Jane, and Ling, Edgar R., R. Coll. of Sci.; Mann, Donald, Univ. Coll.; Mellins, Sydney, E. Lond. Coll.; Perren, Edward A., R. Coll. of Sci.; Reilly, Amy A. B., Univ. Coll.; Robinson, J. H., Bedford Coll.; Shatwell, Victor L., Birkbeck Coll.; Swainson, V. E. S., Bedford Coll.; Toms, Harold, Birkbeck Coll.; Ward, William C. J., Northern Polytech. Inst.; Wentworth, Vera, Univ. Coll.; Whittingham, Eric H., King's Coll.; Woolf, Sidney S., E. Lond. Coll.

B.SC. EXAMINATION FOR EXTERNAL STUDENTS.

Class I.—Browne, Agnes, R. Coll. of Sci., Dublin; Coffey, Samuel, Univ. Coll., Nottingham; Lewis-Dale, Percy; Saunders, Kenneth H.

Class II.—Driver, John E., Univ. Coll., Nottingham; Evans, Dorothy, Univ. Coll., Nottingham; Green, Gerald; Hewis, Harold W., Univ Coll, Nottingham; Stubbings, Wilfred V., Univ. Coll., Southampton.

Class III.—Barber, Harold H., B.Sc., Univ. Coll., Nottingham; Ford, Mary B., B.Sc., The Polytechnic; Hunt, Beatrice E., Univ. Coll., Southampton; Mason, May J., Univ. Coll., Southampton; Poole, Harold J., Northern Polytech. Inst.; Smith, John D., Finsbury Tech. College.

Society of Dyers and Colourists

PROFESSOR J. T. HEWITT, F.R.S., gave a lecture, under the auspices of the West Riding Section of the Society of Dyers and Colourists, in the Hotel Metropole, Leeds, on Thursday, Dec. 4, on "Non-Aromatic Intermediates in Dye Manufacture." Members of the Society of Chemical Industry were also present.

Mr. J. C. Oxley, presiding, said that this was the first meeting of the society which had been held in Leeds, and it had been convened as an experiment to bring their work before their members in that district.

Professor Hewitt then gave an exhaustive lecture covering the work which had been accomplished up to date, including a review of the methods and patents emanating from other countries. He also dealt with the alipathic compounds used in dye manufacture, such as methyol, alcohol, succinic acid, aldehydes, acetone, and phosgene, used in the manufacture of such dyestuffs as rhodamin S., tartrazene and indigo.

Following an interesting discussion, Professor A. G. Perkin moved a vote of thanks to the lecturer, and said that when the war broke out they had found that they had only three or four able chemists who could be considered as leaders in the colour industry, and of those Dr. Hewitt was one. Unless they could increase the number of such experts in the future they could not hope to wrest from Germany her superiority in that sphere, and consequently there must be a larger number of young men devoting themselves to research work. Of all the branches of chemistry, organic chemistry had been the least fashionable in this country during the last score years.

Scottish Oil Industry

A MEETING of the Mining Institute of Scotland was held in the Royal Technical College, Glasgow, last Saturday. Mr. R. W. Dron occupied the chair. The possibility of finding liquid oil in Scotland, which had been referred to in a Paper by Mr. H. M. Cadell, was discussed at some length. The opinion was expressed that liquid oil was not likely to be found in the present shale fields, but that it might be looked for further east and west, in Haddingtonshire and Lanarkshire. A point brought out in the discussion was that while the Scottish shale workers were afraid that the new company which had been formed for the purpose of taking over the Scottish oil companies would stop the shale mines and leave them only with the refineries, it had been stated that the Scottish oil was needed along with the other oils, and that mining for oil in Scotland would in all probability continue. The Paper by Messrs. William Hill and J. A. Cock on "Fuel Economy in the Production of Power at the Apedale Works of the Midland Coal, Coke and Iron Co., Ltd., Newcastle," was also discussed.

Association of Industrial Chemists

Annual Meeting of the Newcastle Section

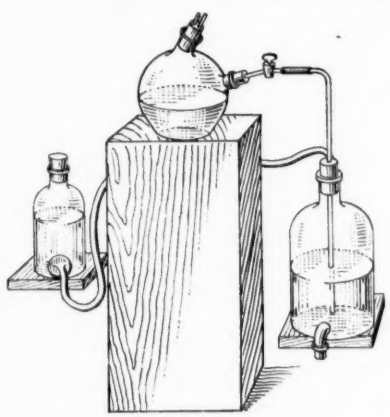
THE annual general meeting of the Newcastle and District Section of the National Association of Industrial Chemists was held at Newcastle on Saturday, December 6, under the chairmanship of Mr. J. S. F. Gard. The treasurer's report and financial statement were read and adopted, and the following officers were elected: Chairman, Mr. E. L. Burt, in succession to Mr. J. S. F. Gard; vice-chairman, Mr. E. Turner, in succession to Mr. J. Martindale; secretary, Mr. E. P. Lumley, re-elected; assistant secretary, Mr. W. M. Sowerby, re-elected; treasurer, Mr. A. R. Hord, re-elected.

The following were elected to the Council: Messrs. D. Stenhouse, W. M. Sowerby, J. W. Martindale, J. S. F. Gard, J. W. Macaulay, D. Rogers, A. Shaw and J. B. Ridley. Mr. A. R. Hord and Mr. E. Turner were elected delegates to attend the National Council meetings.

It was decided that all meetings of the section for the coming year should be held in the Church Institute, Newcastle, and that an annual dinner should be held, immediately to precede the annual general meeting. The first dinner is to be held early in January of next year.

New Form of H_2S Apparatus

A description was given by Messrs. S. Richardson and H. W. Keenan of a new form of H_2S apparatus patented by them. According to the author's account the apparatus is at once simple and efficient; the generating flask is of such construction as to admit of its being re-charged without dismantling the apparatus in any other way than the removal of one cork; the acid chambers can be emptied and refilled without dismantling, and the ferrous sulphide can be washed in about one minute or less each time the apparatus is used. The invention is capable of generating gas in a steady stream, owing to the fact that the amount of acid used is in proportion to the evolution of the gas. This prevents any flooding of the



generating chamber and, consequently, sudden evolutions of gas which occur in other types of apparatus. The pressure of gas drives not only the acid back into its reservoir, but by reason of the construction of the generating chambers the acid falls back by gravity. The washing of the apparatus can be accomplished when no water is laid on to the fume closet, or this can be dispensed with and a suitable outlet provided at the base of the generating flask when water is laid on. If the supply of water is taken direct from a tap it will be preferable to have a T piece with a stop cock as an outlet.

The advantages of washing claimed are: (1) Any spare gas is driven out of the generating chamber into the wash water, thus securing a fairly saturated solution in laboratories where much H_2S water is used in preference to gas; (2) the life of the reagents used is considerably lengthened, as all the fine particles of ferrous sulphide are washed away; moreover, there is no clogging of the apparatus due to the formation of ferrous sulphate crystals or chloride of iron. The apparatus was made up from odds and ends in a laboratory where a steady stream of gas was desired for a few minutes at intervals of about a fortnight. With the general type of apparatus it was necessary to clean almost every time, whereas on trial, after standing six to eight weeks after use, this apparatus gave off a steady stream of gas almost immediately. A great improvement, although more costly, would be to have the T piece equipped with glass stop cocks in place of the Mohr's clips. There were other mechanical advantages which could easily be incorporated in the apparatus if necessary, such as an acid reservoir adjusted to any height by a movable shelf.

"Thermonite"

To the Editor of THE CHEMICAL AGE.

SIR,—We are obliged to you for the editorial notice of "Thermonite" in THE CHEMICAL AGE, and might mention that this has brought us a number of interesting inquiries. There is no doubt that a refractory material of this kind, although it is somewhat expensive, is urgently required. There is still a great deal of research work to be done, and in view of the fact that price does not always enter into the question when the advantages are known, we are confident that "Thermonite" has a very big future, and will be invaluable for the betterment of the higher industries.—Yours, &c.,

p.p. J. H. SANKEY & SON, LTD.,
H. M. SANKEY,
Director.

74, Cheapside, E.C.2.
December 4.

Institute of Chemistry: Liverpool Section's Dinner

THE Liverpool Section of the Institute of Chemistry held its first annual dinner at the Adelphi Hotel, on Friday, December 5, Sir Herbert Jackson, the president of the Institute, presiding.

Mr. John Gray (President of the Society of Chemical Industry), in proposing "Liverpool, with its Industries and Commerce," said that Lancashire was the home of the heavy chemical industry, and some of the most important factories in the country were near Liverpool. As to the future of the chemical indutsry, we had not much to fear from Germany or the United States, the uncertain position of labour at home being what we had to fear. They must consider what could be done in the general bringing up to date of the processes employed in chemical industries.

Alderman Muirhead, in replying, said that at the present time we were at a parting of the ways, and we had either to go backward or forward. He thought it would be a good thing to endow a chair at the University for the purpose of teaching trade union leaders something of political economy. Production only would promote prosperity, and the limitation of production distinctly meant that we were on a downward grade. We needed a system of grading. Every man must do his best according to his ability and his wishes. Co-ordination among local authorities was also a necessity for the prosperity and well-being of the city.

Later, Alderman Muirhead proposed "The Institute of Chemistry," saying that the co-ordination between the chemist and the engineer was an important thing for this country. The chemist was now a necessary adjunct to other trades.

Sir Herbert Jackson congratulated the Liverpool section, the first local section to be formed and organised. There were nearly 3,000 members in the Institute, which had aimed to become the professional body, ensuring that those who belonged to it had the necessary training, and maintaining in those who practised the highest integrity and efficiency. The Institute had filled a definite place in the history of the progression of chemistry. He wished the Liverpool section every possible prosperity.

Mr. D. Cardwell, of the Manchester section, proposed "The Liverpool Section of the Institute."

Grays Chemical Works, Ltd.

THE petition of G. H. Morgan for a winding up order against Grays Chemical Works, Ltd., which has been before the Court on more than one occasion, was again mentioned by Mr. Justice Astbury in the Companies Winding-up Court on Tuesday. Mr. Lavington, for the petitioner, a creditor, said he had been satisfied, and he (counsel) asked to be allowed to withdraw the petition.

Mr. Vanneck, for the company, agreed, and the Court granted the application to withdraw the petition.

MR. L. P. WILSON, of Messrs. Courtaulds, Ltd., Coventry, lecturing last week under the auspices of the Keighley Textile Society on "The Dyeing and Finishing of Artificial Silk," said that up to the present time artificial silk had been produced in four ways—nitro-cellulose, cupro-ammonium, viscose, and cellulose-acetates. After describing laboratory and dye-house work, Mr. Wilson expressed the opinion that in the near future British dyes would be available in sufficient quantity to supply all home requirements.

Society of Chemical Industry

Papers at the Manchester Section

THE third meeting of the Manchester Section of the Society of Chemical Industry was held at the Grand Hotel, Manchester, on Friday, December 5, there being a record attendance. Mr. John Allen presided.

A Super-microscope

Messrs. F. Davidson & Co. (London) gave a demonstration of a combination of both microscope and telescope, performing the work of both instruments, and filling the gap between them. By means of the instrument direct microscopic observations could be made at a distance from the microscope on objects, which, by reason of their size or shape, could not be examined on the stage of the microscope. The characteristic feature throughout was depth of focus and large field consequent upon long working distance.

"The Activated Sludge Process of Sewage Purification"

An exceedingly interesting Paper was presented on this subject by Dr. Edward Ardern. In continuance of earlier work, the results of which had been published at frequent intervals during the past five years, Dr. Ardern described, with the aid of lantern slides, a large-scale continuous-flow unit for the treatment of Manchester sewage (Withington Works) by the activated sludge process, and gave a detailed account of its operation since it was installed in October, 1917. The plant, the construction of which involved structural alterations to an existing tank, cost approximately £2,200, and was designed to treat 250,000 gallons of sewage per day, with an average aeration period of four hours. The effective capacity of the plant had been found to be well above this volume. No difficulty had been experienced in obtaining uniform distribution of the diffused air employed, or in connection with the use of diffusers. The air consumption varied from 0.8 to 1.5 cubic feet free air per gallon sewage treated. In the case of the Withington sewage, which was a weak domestic sewage free from trade waste, it need not, on the average, exceed 1½ cubic foot free air (compressed to 3.1 lb.) per gallon of sewage treated if a high degree of nitrification was not required. The sludge production, apart from detritus tank sludge, was equal to 0.6 ton, dry matter, per million gallons sewage treated. This sludge, on dry basis, contained 6.5 per cent. nitrogen, which field trials had proved was available for plant nutrition. Dr. Ardern exhibited lantern slides illustrating a much larger continuous-flow unit erected at the Manchester Corporation Main Outfall Works, at Davyhulme, for the treatment of the mixed city sewage, and of various other plants which had been installed in different parts of the country.

"A Method for Determining the Relative Temperatures of Spontaneous Ignition of Coals"

Papers on this subject by F. S. Sinnatt, M.B.E., M.Sc.(Tech.), F.I.C., and Burrows Moore, M.Sc.(Tech.), B.Sc.(Eng.), A.I.C., were presented.

Mr. Sinnatt said that this method consisted in dropping a small weight of coal into a crucible maintained at a series of constant temperatures. At each particular temperature a time record was kept of the following phenomena: (*a*) the time at which glowing in the coal first occurred, (*b*) the time at which spontaneous ignition or explosion occurred. The results had been plotted for a number of coals, and it appeared that the graph showing the time at which glowing occurred was comparatively regular, whereas, with the spontaneous ignition there appeared to be zones of temperature at which the compounds ignited with greater difficulty. It was suggested that the temperature-time curve, at which glowing occurred, should be used as a means for characterising coals. Two examples were quoted of the curves obtained from coals which were known to produce gob fires, and these had been found to differ materially from the curves obtained from ordinary bituminous coals. Preliminary experiments showed that the fineness of the coal had a great influence upon the temperature at which glowing occurred, and with mixtures of fine and coarse coal the temperatures at which glowing occurred tended to approach that of the finest material. Certain preliminary experiments were also quoted showing the influence of previously heating the coal upon the temperature at which glowing occurred. The research appeared to be of importance from the point of view of the stroage of coal, and, after further results had accumulated, might be of considerable value in the study of gob fires.

Catalytic Actions at Solid Surfaces

A PAPER by Dr. E. F. Armstrong and Dr. T. P. Hilditch on "The Transference of Hydrogen from Saturated to Unsaturated Organic Compounds in the Liquid State in Presence of Metallic Nickel," was presented by Professor H. E. Armstrong, F.R.S., at a meeting of the Royal Society on Thursday, December 4.

The Paper showed that the catalytic action of metals, like that of certain enzymes, was reversible; in other words, compounds which were saturated in the ordinary sense were capable of interacting with the metal to form a system which broke down into a more stable equilibrium consisting of hydrogen and a less saturated compound. This was readily demonstrated in the case of cyclohexanol: when a mixture of cyclohexanol and methyl cinnamate was heated at 180° in presence of nickel a considerable transference into cyclohexanone and methyl β-phenylpropionate was effected. It was necessary that both components of the system should be present in the liquid state. Dehydrogenation had also been effected in the case of hexahydroxylene and dihydropinene mixed with methyl cinnamate in presence of nickel: in these cases a temperature of 230° was required. At this temperature small quantities of an ethyl oleate of unknown structure was obtained from ethyl stearate. Our theories of catalytic hydrogenation and dehydrogenation in the liquid state afforded some explanation of the products obtained during the hydrogenation of unsaturated glycerides. Moore (*J. Soc. Chem. Ind.*, 1919) had shown that partial hydrogenation of ethyl oleate caused formation of ethyl stearate, and also of ethyl esters of isomeric forms of ordinary oleic acid, most probably ethyl elaidate and an ethyl "iso-oleate" derived from $\Delta^{11:12}$ oleic acid. The appearance of the elaidic ester, the stereo-isomeric form of ordinary oleic ester, was readily explained by the assumed equilibrated action between catalytic nickel and the ethylenic linkage, for on reformation of constituents during balanced action it was plain that either or both stereo-isomeric ethylenic derivatives might result.

A Parliamentary Airman's Diary

CAPTAIN WEDGWOOD BENN, M.P., in his book "In the Side Shows" (Hodder & Stoughton, pp. x., 310, 12s.) gives us a lively and entertaining diary of his "four years of happy adventure" in the Army—some eighteen months in the Dardenelles campaign and the rest as a member of the Air Force. In many cases these experiences on five fronts would have stood out as the supreme experiences of a lifetime; in Captain Wedgwood Benn's case they constitute merely an episode in a busy and crowded life. Early in the war he turned aside from tempting political prospects to take his part in the fighting, and unlike some distinguished Parliamentarians, he took the part very seriously and earned a succession of distinctions which even an old campaigner might be proud of. His work in the Army done, he slips back at once into his old interests, and all that remains of his citizen soldier days are his decorations and the vivid memory of his adventures which this pleasant volume preserves. It is a simple and engaging personal story, told with the author's characteristic vivacity; a diary of his work on five fronts, with descriptions of many thrilling moments, and passing impressions and criticisms of the military life in general. The narrative is illustrated by a collection of excellent photographs, and letterpress and pictures together make up one of the most interesting human documents of the war.

£5,000 Damages for Sir A. Mond

IN the King's Bench Division on Friday, before Mr. Justice Darling and a special jury, the action was concluded in which Sir Alfred Moritz Mond, Bart., First Commissioner of Works, sued Mr. Harry Macleod Fraser and Mr. Henry Hamilton Beamish for an injunction to restrain them from printing, publishing or exhibiting any poster or advertisement, alleging that he was a traitor, or from publishing any similar libel affecting him in his profession and office, ended in a verdict for £5,000. The defendants on March 18 last exhibited in a large poster in a window at Spring Gardens, Charing Cross, London, the following words: "Sir Alfred Mond is a traitor; he allotted shares to the Huns during the war." The plaintiff said that these words were falsely and maliciously published, and that they were a libel on him.

The jury returned a verdict for the plaintiff, with £5,000 damages, and judgment was given accordingly, with costs.

IT IS STATED that a glass-making factory on a very large scale will shortly be started in South Staffordshire, and that it will be controlled by a syndicate which holds the patent for rapid production in large quantities at cheap rates.

Explosion at Chemical Works

Appeal by Rainham Chemical Works, Ltd

In the Court of Appeal, on Thursday, December 4, before the Master of the Rolls, Lord Justice Atkin, and Lord Justice Younger, the Court reserved judgment in appeals from a decision of the High Court in two actions: the Belvedere Fish Guano Co., Ltd., *v.* Rainham Chemical Works, Ltd., and Ind, Coope & Co. (1912), Ltd., *v.* the same.

The Facts of the Case

The appeals, which arose out of the same facts, raised important questions of law. The defendants, the Rainham Chemical Works, Ltd., Samuel James Feldman and Robert William Partridge, directors of the defendant company, appealed against a decision of Lord Justice Scrutton (sitting as an additional Judge of the King's Bench Division). The two actions were brought by the plaintiffs claiming damages for injury to their properties by an explosion at the defendant company's chemical works. The Rainham Chemical Works, Ltd., was a private company, incorporated on March 17, 1916, for the manufacture of picric acid (or tri-nitro-phenol) and other purposes, with a nominal capital of £5,000, divided into 100,000 shares of 1s. each. The company was formed by the defendants, Feldman and Partridge, after negotiations with the Ministry of Munitions. Feldman was a retired solicitor and Partridge an art dealer, and they financed the company and became the sole governing directors, and were the only two signatories to the memorandum of association. By a contract dated August 24, 1915, made between the Ministry of Munitions, the contractors, Messrs. Feldman and Partridge, and the chemists. Dr. Maron and Dr. Wyss, whose novel processes were being used, it was provided (by clause 3) that on the completion of the erection or adaptation of the plant the contractors should, subject as therein provided, on their sole responsibility and at their sole risk, operate, manage and work the plant, but in the event of any explosion which should not be due to any act or default of the contractors, they should not be liable to replace any property of the Minister destroyed by the explosion. By an agreement dated March 22, 1916, Feldman and Partridge agreed to sell the undertaking to the Rainham Chemical Works, Ltd., at a price to be ascertained on taking an account, and until payment the company was to be deemed to be retaining possession of the premises, machinery and plant as the agents of the vendors.

For the manufacture of picric acid the company used large quantities of di-nitro-phenol (hereafter referred to as D.N.P.). The explosion happened through a fire in the nitrating shed at the works next to which the D.N.P. was stored. Up to this time it had not been realised that D.N.P. was an explosive. It was difficult to set fire to it, and it did not explode by percussion. The chemical works were divided into two parts. One part was paid for by the Ministry of Munitions, and was for the supply of explosives to the Government. There was another separate part, which was used for supplying other persons with explosives, and was not paid for or controlled by the Ministry.

Lord Justice Scrutton held that the defendant company was liable for the damages caused by the explosion on the principle of Fletcher v. Rylands. He also held that the defendant company was substantially a sham, and that the business was substantially carried on by Feldman and Partridge, and that they were, therefore, personally liable for the damages. The actual paid-up capital of the company was only 2s., in respect of the two shares taken by the signatories of the memorandum.

The defendant company and the defendants, Feldman and Partridge appealed.

The Appellants' Submission

Mr. Montgomery and Mr. Maddocks, for the appellants, submitted that if the defendants were liable at all, the company which carried on the business was alone liable, and they relied on *Re* A. Salaman & Co., Ltd., ([1897] A.C., 192). The work that was being done when the explosion occurred was done under a contract with and orders of the Ministry of Munitions. The Ministry was protected from liability, and so were its authorised agents. Moreover, the doctrine of the well-known case of Fletcher *v.* Rylands (L.R., 1 Exch., 265) rendering the occupier of land liable for the escape of any substance or fluid likely to do damage to neighbours did not apply where the land was properly used for the general benefit of the community and the defence of the realm in time of war. Under the Prerogative of the Crown and the Defence of the Realm Regulations there was the right to manufacture and store explosives in selected places under proper regulations, and it would be necessary to prove negligence to establish the liability of the defendants. The company could not be floated, and its shares offered for public subscription, because of the veto of the Treasury.

The Respondents' Case

Mr. Matthews, for the respondents, contended that the defendants were not servants or agents of the Crown, and so entitled to protection from liability; they were independent contractors. The analogy of the Public Authorities' Protection Act applied, and it had been held that contractors were not protected by that Act (Kent County Council *v.* Folkestone Corporation). That was confirmed by the terms of the agreement between the Ministry and the defendants. There was a whole series of cases showing that officers of the Crown were personally liable for collisions and other acts which caused damage. Statutory powers were only a protection if all reasonably practical means known to science were taken by the persons in charge of the works. In cases of tort, whether or not the master was liable for the acts of the servant, the servant was always liable. It was no defence in an action for damage caused by the escape or explosion of a dangerous substance to say that no one knew or suspected it to be dangerous. The business was a nuisance and a danger before the company was formed to take it over, and the company was formed *ad hoc*, and was a sham. The liability for a tort was not assignable by law. The agreement between the Ministry and the defendants, Feldman and Partridge, was not assignable. The evidence was that the Ministry had refused to recognise the company.

Mr. Hurst, for the plaintiffs in the second case, Ind, Coope & Co., adopted and supplemented the argument of Mr. Matthews.

Mr. Montgomery replied for the appellants.

At the conclusion of the arguments the Court took time for consideration.

Chemical Employers and Shift Men's Wages

The Chemical Employers' Federation have prepared a memorandum on the report of the employers' representatives on the Shift Inquiry Committee. They remark that they are impressed by three particular features of the report. (1) That the evidence of unrest was submitted in the main by trades union officials, and was not in any single instance corroborated by the employers, whose experience was that their workmen have not exhibited signs of unrest and discontent; (2) that the reductions in earnings of which complaint was made to the Shift Inquiry Committee were the direct and logical result of a national agreement between the men's unions and their employers (the Chemical Employers' Federation feel that the workmen concerned have no reasonable ground for complaint, and should loyally abide by the agreement made on their behalf); (3) that the claim for a shorter working week for shiftmen or alternatively, that a cash advance be conceded to those men, was put forward in accordance with the usual rule that a concession made to one class of workmen must be extended to all. The present position, the Federation state, is that on the average, day labourers have received advances amounting to 176 per cent. and shiftmen 160·7 per cent. over pre-war rates; whereas the cost of living is given as being 125 per cent. in excess of pre-war. Chemical manufacturers feel, therefore, that these figures discount entirely the grievance in regard to the conversion of 12 to 8 hour shifts. The proposal of the unions for minimum rates of 1s. 6d. and 1s. 8d. would impose an impossible burden on the great majority of manufacturers and certainly created unemployment. Further, the chemical trade has been endeavouring to ascertain what are likely to be its commitments under the Hours of Employment Bill, but so far has failed to do so. It may be that each manufacturer will be obliged to employ one-sixth additional shiftmen in order to reduce the present shiftmen's hours to 48, and this means very serious additional expenditure. Having regard, therefore, to all the circumstances, the Chemical Employers' Federation cannot agree to any further advance in wages as proposed by the union representatives on the Shift Inquiry Committee.

Potash and Cement Production in Norway

Norway possesses very large deposits of potassic feldspar, especially on the southern coast, from Kragerè to Kristinasand. Many attempts have been made to work them but they have, hitherto, proved unsuccessful, as the precentage of potash is too low to pay for direct extraction. The Portland Cement Factory, Dalen, near Brevik, in Norway, has, as licensees for the Western Precipitation Co., Los Angeles, Cal, introduced the American system of cement manufacture with rotary furnaces and electric dust precipitators, and the managing director of the Dalen Company has invented a new method for increasing the yield of potash by using crushed limestone mixed with crushed feldspar instead of ordinary chalk and clay. The result has been most satisfactory, as the compressive strength of the cement has increased from 2,850 lb. per square inch to 8,500 lb. per square inch after 28 days and to 10,200 lb. per square inch after three months. The present production of 150,000 tons annually requires about 240,000 tons raw material, consisting of 75 per cent. of limestone and 25 per cent. of potassic feldspar, containing 1·5 per cent. of K_2O, or pure potash. It is estimated that an increase in the production to 500,000 tons of cement annually will furnish the whole of Norway's requirement of potash, amounting to 4,500 tons of K_2O. A Danish firm of cement manufacturers in Copenhagen, and a Swedish firm in Stockholm, have been co-operating with the Dalen Company in working out details of the system, which is covered by patents.

From Week to Week

THE BOARD OF TRADE announce that margarine and oleo margarine have been removed from List " A " of prohibited exports.

THE NON-FERROUS MINING COMMITTEE has now concluded hearing evidence on tin mining and has begun its inquiry into lead and zinc mining.

THE DEATH is announced of Prof. A. Werner, Professor of Chemistry in Zurich University, Nobel prizeman for chemistry in 1913, and foreign member of the Chemical Society, at fifty-two years of age.

MR. SMALLEY presided over a meeting of the Newcastle Chemical Industry Club last week, when Mr. T. Young read a Paper on " The Practical Working of a West African Gold Mine."

MESSRS. TURNER BROTHERS ASBESTOS CO., LTD., announce that their Rochdale and Trafford Park works will be closed from Christmas Day, December 25, to Saturday, December 27, both days inclusive.

AS A RESULT OF AN EXPLOSION in a blast furnace at the Apedali Works of the Midland Coal, Coke, and Iron Co., Ltd., North Staffordshire, six men were injured.

A MESSAGE from Santiago, Chili, dated December 3, states that the Columbian Commercial Mission is visiting the nitrate regions in the North of Chili, where they intend to acquire a vast concession.

THE COUNCIL of the Royal Institute of Public Health has appointed Professor Maurice Nicoll, of the Pasteur Institute, Paris, Harben Lecturer for 1920.

DAMAGE ESTIMATED AT £3,000 has been done by fire at the oil, paint and varnish works of Montgomerie, Stobo & Co., 58, George Street, Mile End, Glasgow.

A PARIS TELEGRAM states that borings carried out in Alsace have established that there are deposits containing, it is estimated, 320,000,000 tons of pure potash.

THE BRITISH SCIENCE AND KEY INDUSTRIES EXHIBITION at the Kelvin Hall, Glasgow, was closed last Saturday. It is estimated that during the three weeks' session 200,000 visitors attended.

MR. J. W. WOOD, A.I.C., research chemist at the Fuel Department of the Leeds University, read a Paper on " Efficiency and the Effect of Inerts upon the Thermal Efficiency in the Use of Coal Gas," at a meeting of the Midland Junior Gas Association last week.

AT A MEETING of the University Court of St. Andrews, on Saturday, Dec. 6, Sir John Herkless (Principal) presiding, it was reported that by arrangement with the recently incorporated St. Andrews Institute of Clinical Research, it is proposed to establish lectureships in Biological Chemistry and Bacteriology. The Senatus Academicus have been invited to express their views on the proposal.

THE EXPORT OF GRAPHITE from Ceylon in 1918 showed a serious falling off, only 15,000 tons being shipped, as against 33,400 tons in 1916. The figures for this year are even worse, 4,437 tons only having been exported up to the end of August. This is largely attributed to the accumulation of stocks in America—Ceylon's best market—and to the competition of Korean and Madagascar graphite.

DAMAGE AMOUNTING TO several thousands of pounds was caused by fire last week at the premises of Messrs. E. Brookbank & Co., Ltd., oil refiners, Trafford Park, Manchester. The premises are in the midst of other big oil storages, but fortunately the portion of the works in which the fire broke out was built of solid brick, and in spite of large quantities of oil and tallow which were stored there the fire was confined to a comparatively small area.

THE FOLLOWING ARE THE OFFICIAL FIGURES of the November exports of Nitrate of Soda:—To Europe, 53,570 tons, against 48,640 in 1918; to United States (east and west coasts), 33,430 tons, against 168,870; and to various places, 7,810 tons, against 10,180. Estimated loadings at December 1 for dispatch to Europe are 39,360 tons, against 3,000, and to the United States, 22,730 tons, against 72,560.

MR. C. S. GIBSON, formerly Professor of Chemistry in the Maharaja's College, Trivandrum, Travancore, and during the war honorary chemical adviser to the Chemical Warfare Department of the Ministry of Munitions, has been appointed Professor of Chemistry in the Egyptian Government School of Medicine, Cairo. Professor Gibson is a son of Mr. Joshua Gibson, of Manchester, and an old boy of the Manchester Grammar School.

IT WAS ANNOUNCED by M. Henri Berenger, at a meeting of the General Petroleum Committee, held in Paris on Saturday, December 6, that petroleum in sufficient quantities to be of commercial use had been discovered at Djebel Tolfat, near St. Jean, in Morocco. There is an abundant gush of oil, which has been collected by makeshift means up to an amount of 3 tons a day. M. Berenger added that it is intended to sink 12 new shafts in 1920.

WITH THE OBJECT of promoting the development of mineral resources at home and abroad, the Minerals Development Association has been organised by Captain C. G. Moore, with offices at 24, Lawrence Lane, Cheapside, E.C. The association is not a trading body but a club, and its membership is not restricted to those engaged in mining. One of its functions will be to advise landowners on whose properties minerals exist as well as those professionally engaged in mining.

A BUREAU OF RATIONAL HEATING has recently been created under the auspices of the French Government (Ministry of Reconstruction), from which department it obtains a grant. The object of the office is to investigate the best methods of utilising, as far as possible, fuels of inferior quality; to train foremen and stokers in a special " Rational Fuel School " specially set up for the purpose. The use of heavy oils will also be investigated as well as the various systems to be adopted for converting coal-fired boilers into boilers fired by heavyoils.

DURING THE LAST TWO YEARS the Butterley Coal Co. have been conducting borings for coal at Hayton Smeath, near Retford, and now it is reported that oil has been found present to an extent which seems to justify the possibility of the place being worked as oil wells. Government officials have been down and taken samples. The oil is said to resemble in every respect the oil found recently in Derbyshire, and it comes away with the water in a thick, pasty substance, and is very inflammable. Experts pronounce it to be of excellent quality.

TO OBVIATE THE DAMAGE to fisheries caused by the washings from tarred roads, experiments have been conducted during the past six months by a Joint Committee of the Ministry of Transport (Roads Department) and the Board of Agriculture and Fisheries. The experimental work includes the production of a road tar which could be recommended for use in the neighbourhood of fishing streams. The South Metropolitan Gas Company have produced a synthetic tar which is now under examination in comparison with a standard Road Board tar.

THE CHICAGO SECTION OF THE AMERICAN CHEMICAL SOCIETY has presented the Willard Gibbs medal, which is awarded annually by a jury of twelve to an outstanding figure in American chemistry, to Dr. William A. Noyes. Professor of Chemistry in the University of Illinois. Dr. Noyes occupies a high position as a teacher, an investigator and a leading member of the American Chemical Society He is widely known as the author of text-books on qualitative analysis and organic chemistry and as the editor of the *Journal* of the American Chemical Society.

AT THE REQUEST of the Ministry of Transport, the County Surveyors' Society has appointed a Committee to investigate the cause of the numerous complaints which have been received from horse owners and users as to the slippery condition of certain roads surfaced with tar, tar compounds and asphalt. This committee will have authority to carry out such experimental work as may be necessary to enable them to make definite recommendations with a view to overcoming the difficulty. Any suggestions which may be thought to be helpful to the committee are invited, and communications should be addressed to the Chief Engineer, Ministry of Transport (Roads Department), 6, Whitehall Gardens, London, S.W. 1.

MR. PREEBLE, chairman of the London Section of the National Association of Industrial Chemists replying to a correspondent of the *Daily Mail* who asked whether the German industrial chemist is superior to the British, states that the fault lies with our manufacturers, who either from lack of enterprise or want of knowledge as to the value of science, employ chemists only to a very limited extent compared with their German rivals. Our colleges, Mr. Preeble says, are successfully urging students to study chemistry, but one wonders if our masters of industry will ever rise to the occasion and offer these people work at a dignified wage? At present there is no sign of this, and a number of skilled chemists are seeking employment.

THE UTAH SALDURO CO. is taking action to secure patent rights in respect of 1,543 potash mineral claims of 20 acres each in Tooele County, Utah. Beginning in 1916, the Salduro company instituted experimental work on lands west of the Great Salt Lake, on the line of the Western Pacific Railroad, about 112 miles west of Salt Lake City. The company, it is stated, has perfected a method of extracting the commercial salts from the brine-incrusted soil of the Great American Desert. About 150 miles of trenching has been dug and by various processes the salts are precipitated until potash salt is collected. The Utah Salduro Co. is understood to be owned by the Solvay Process Co., of Syracuse, N.Y. According to statements by officials of the company the Salduro plant represents the last word in potash recovery from the natural salts of natural deposits. The best engineering experience in the industry has been brought to bear on the project, and an extensive enterprise is anticipated as there are many hundreds of square miles of the salt land in the desert, which is the old bottom of the great inland body of water, Lake Bonneville, of which the Great Salt Lake is a remnant.

THE SCOTTISH BOARD OF HEALTH has issued a statement as to the supply of drugs for 1920, in which they review the negotiations which have taken place on the matter. The present position is, they say, that a claim has been submitted for an increase of not less than 50 per cent. on the Scottish scale put forward by the chemists, but not granted in 1913, or a 200 per cent. addition to the rates at present ruling. To sum up, the chemist, they say, has received in the past an increasing rate of profit with the increasing price of drugs in the tariff, which has acted as a sliding scale; gets on the present tariff a gross trading profit of over 50 per cent.; claims, in addition, a professional fee amounting to at least a rate of £500 per annum, or as now restricted to £375; and is offered in addition for professional services a rate of £250 per annum. The Board hopes that on reconsideration the Pharmaceutical Society will be disposed to continue service in 1920 on the terms offered to them. A general refusal by the chemists of Scotland to contract would necessarily compel the Board to consider an entirely different method of providing for the supply of drugs and medicines.

Chemical Matters in Parliament

Government Shares in British Dyestuffs Corporation

Major Barnes asked the President of the Board of Trade (House of Commons, December 4) if he would state in what vote or votes appeared the whole or any part of the sum of £1,700,000 subscribed by the Government to the share capital of the British Dyestuffs Corporation, or if the whole or any part of it had not yet appeared; and in what vote and when the sum or any part of it would be submitted to the House.

Sir Hamar Greenwood: Provision for £334,046, being balance of a sum of £1,500,000 for investment in British Dyes, Ltd., will be found in the Board of Trade Estimates, Class II., Vote 8, sub-head I., for 1919-20. The sum of £1,165,954 previously invested in such debenture bonds was provided out of the vote of credit, and has appeared or will appear in the Appropriation accounts relating thereto. These bonds were cancelled during the present financial year, and the sum of £1,700,000 was invested in the British Dyestuffs Corporation in the purchase of the following fully paid shares—viz., 850,000 7 per cent. preference shares of £1 each, 850,000 8 per cent. preferred ordinary shares of £1 each. One fully-paid preference share (£1) was allotted to the nominees of the Government, conferring special voting powers under the articles of the company. The balance for which no provision was made in the Board of Trade Estimates has been temporarily met out of the Board of Trade Vote, and it is proposed to submit a Supplementary Estimate to be laid before Parliament in due course.

Major Barnes further asked the President of the Board of Trade if his action in giving preferential assistance to a particular company engaged in the manufacture of dyes by subscribing to the share capital of that company had received the consent of the House of Commons; and, if not, if he purposed to submit his action for the approval of the House.

Sir Hamar Greenwood: The policy of Government financial support to British Dyes, Ltd., was fully discussed in this House in 1915, and as regards the recent change in the form of that support I would refer the hon. and gallant member to the answer to his previous question.

Cattle Foodstuffs

In reply to questions by Mr. Remer (House of Commons, December 3) regarding cattle foodstuffs, Mr. Roberts stated that there was now no director of supplies in the cattle feeding-stuffs section of the Ministry of Food. This section was incorporated in the oils and fats branch of the Ministry last June. Mr. Lionel Lillico did not resign the office of director of supplies. He became chief technical adviser to the section in an honorary capacity when the section was merged in the oils and fats branch. At the time when the distribution of cattle feeding-stuffs was under Government control allocations to the trade were made by a committee of the trade, and Messrs. William Lillico & Sons received a proportionate allocation. Since controlled distribution ceased this firm had, in competition with the trade, purchased some 2,000 tons of cotton meal from Government stocks at market prices.

Investment in Anglo-Persian Oil

In reply to a question by Major Barnes (House of Commons, December 3), with regard to investments of public moneys in the Anglo-Persian Oil Co., Mr. Chamberlain stated that the Government at present hold 2,000,000 £1 shares in the company, out of 3,000,000 ordinary shares, and had agreed to subscribe in the same proportion to the total ordinary share capital for a further 3,000,000 ordinary shares of £1 each, on which 1s. per share would be immediately paid up. It had been arranged that the remaining 19s. per share on 2,000,000 shares would be paid up shortly. The calls on the remaining 1,000,000 shares would not be made for some years. Tentative arrangements for financing the call of 19s. per share on the 2,000,000 shares have been made, and will be embodied in a Bill which will be presented to the House immediately.

Trade Monopolies

Mr. Jesson asked the Prime Minister (House of Commons), December 4) if he were aware that certain industries in the country had now become monopolies, and that others were steadily moving in the same direction by amalgamations and other forms of absorption now going on; whether the Government had any considered policy for the protection of the consumers' interests against the controllers of these monopolies; whether he would consider the advisability of the Government acquiring an interest in all these monopolies on the lines of the Government's interests in such commercial undertakings as the Suez Canal Company, Limited, British Dyes Company, Limited, the Anglo-Persian Oil Company, Limited, and other industrial concerns, with a view to the protection of the consumers' interests without interfering with the initiative of private enterprise; to assisting in increasing production; to making labour a partner in these industries, as recommended in the report upon Whitley Industrial Councils; and, after allowing a fair return for the use of the capital invested in these undertakings, to advocate the division of the surplus between the Government to assist the nation's finances, labour and management as extra remuneration for increased output, and the owners of the capital to encourage further industrial enterprise?

The Prime Minister: The Government is alive to the movement referred to and is watching it closely. The Government has taken power to investigate the operations of combinations and monopolies in the Profiteering Act, and the question of the extension of those powers is under consideration. A number of inquiries are being made, especially in reference to the effect of such combinations on prices, and the future action of the Government will be considered in the light of the reports following upon the inquiries referred to. As regards the third part of the question, I do not think the suggestion is practicable.

Differential Treatment of Ferro-Alloys

Mr. T. Griffiths asked the President of the Board of Trade (House of Commons, December 8) whether he would state the reason for prohibiting the importation of ferro-tungsten; whether, in view of the fact that ferro-chrome and ferro-tungsten were both equally essential in respect of the manufacture of special steels, whatever conditions of import applied to one ought to apply to the other; whether, in view of the fact that the relative value of exchange with France was against the British manufacturers of ferro-chrome in the open market, he would take whatever steps were necessary to place manufacturers of ferro-chrome in no less favourable position than the manufacturers of ferro-tungsten; whether he was aware that the differential treatment as between ferro-tungsten and ferro-chrome had resulted in the closing down of valuable plant for the manufacture of the latter material with the consequent unemployment of workpeople who were specially trained for this work during the war; and whether, having regard to the fact that chrome ore was an empire product which was the subject of close Continental control before the war, he would take such steps as would preserve the manufacture of ferro-alloys which had been so costly to establish during the past five years?

Sir A. GEDDES: Ferro-tungsten and tungsten powder have been placed in the schedule of products of Unstable Key Industries, of which the importation is prohibited because of their importance in the manufacture of high-speed steel, which is essential for the engineering industries, and the fact that before the war the United Kingdom was entirely dependent for the supply of these products upon Germany. It is difficult to compare the relative values of various alloys with differing applications, and though the importance of ferro-chrome is fully recognised the Government felt that the case for its special treatment was less strong than that of the substance and articles whose importation they have restricted. The difficulties in which British manufacturers are placed are, I understand, mainly due to the existence of large stocks in this country.

Patent Office Library

Sir A. Geddes, in reply to Mr. Rawlinson (House of Commons, December 8), stated that since November 27 last the Patent Office Library has been opened for three additional hours every evening—namely, from 5 to 8 p.m.

Anglo-Persian Oil Profits

Mr. Swan asked the Chancellor of the Exchequer (House of Commons, Dec. 8), whether any limitation of profit was imposed on the Anglo-Persian Oil Co. in consideration of the financial assistance given to that company by the Government?

Mr. Chamberlain: No, Sir, except that the price ruling under the Admiralty contract for fuel oil is subject to reduction in proportion to the profits realised above a certain limit. There is every reason to hope that a substantial saving will be secured by the Admiralty under this head during the ensuing year.

Export of Palm Kernels

In reply to Lord H. Cavendish-Bentinck (House of Commons, December 5), who referred to the restrictions on the export of palm kernels and other vegetable oil products from British dependencies to territories other than British, and to the consequent discontent among native producers and merchants at home The Prime Minister declined to fix a day for the discussion of the question, and remarked, respecting the allegation of discontent, that there were two sides to the question.

Oil Borings

In reply to Lieut. Clay (House of Commons, November 27) Mr. Kellaway stated that until the boreholes now in progress under Government supervision have reached lower horizons it would be premature to express an opinion on the success or otherwise of the operations, and he referred Lieut. Clay to the official reports which have been published from time to time in the Press. The Hardstoft well, Mr. Kellaway said, was the only one which had been completed to date, and this had given an average weekly production of 1,734 gallons, a figure which it was anticipated would be largely increased when pumping machinery had been installed. No estimate of the cost per gallon raised could be usefully formed at this stage, but the cost of drilling had necessarily been high on account of the heavy cost of materials and freight during the war and the necessity for protecting the coal seams encountered. The question of placing the industry upon a satisfactory financial basis was one which was largely dependent upon the early passage of legislation which was contemplated dealing with oil rights.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

ENGINEERING. Some developments in chemical engineering. A. E. Marshall. *Chem. Trade J.*, December 6, 635-637. A paper read before the American Institute of Chemical Engineers.

GAS. Effects of inerts upon the thermal efficiency in the use of gas. J. W. Wood. *Gas World*, December 6, 451-453. Paper read before the Midland Junior Gas Association.

STEEL. The hardening of steel. H. C. H. Carpenter. *Chem. News*, December 5, 261-264. Conclusion of paper already noted. (See CHEMICAL AGE, pp. 645, 671.)

French

ALUMINIUM. The transformations observed with some aluminium alloys. L. Guillet. *Comptes Rend.*, December 1, 1042-1043. Notes on the disintegration of certain alloys in air.

AMMONIA. The synthesis of ammonia at very high pressures. G. Claude. *Comptes Rend.*, December 1, 1039-1041. Synthesis at pressures up to 1000 atmospheres are recorded.

INSECTICIDES. Influence of temperature and other physical agencies on the insecticidal power of chloropicrin. G. Bertrand, Brock-Rousseu, and Dassonville. *Comptes Rend.*, December 1, 1059-1061.

OILS. Principal researches on the occurrence, methods of obtaining, and chemical composition of oleaginous fruits and seeds. H. Jumelle. *Chim. et Ind.*, October, 1168-1180. The literature of 1914-1917 is dealt with.

STEEL. The phenomena and experimental laws of the tempering of steels. A. Portevin. *Chim. et Ind.*, October, 1139-1160. A useful treatise on the subject.

The critical points of self-tempering steels. P. Dejean. *Comptes Rend.*, December 1, 1043-1045.

TIN. The detinning industry. L. Hackspill. *Chim. et Ind.*, October, 1161-1167. The various processes in use are described and possible improvements noted.

American

POTASH. A further study of the De Roode method for determining potash. T. E. Keitt and H. E. Shiver. *J. Ind. Eng. Chem.*, November 1, 1049-1052. The method is concluded to be accurate.

RUBBER. Meeting of the Rubber Division of the American Chemical Society. *Chem. and Met. Eng.*, October 1, 429-431. Abstracts of the papers read at the meeting at Philadelphia on September 4 and 5 are given.

SHALE. Possibilities of the oil-shale industry. H. M. Roeschlaub. *Eng. and Min. J.*, October 4, 572-576. A general discussion of the outlook for the American industry.

SODIUM SILICATE. Some properties of commercial silicate of soda. J. G. Vail. *J. Ind. Eng. Chem.*, November 1, 1029-1031.

SULPHUR. Method for bringing elementary sulphur into solution for analysis. A. P. Bjerregaard. *J. Ind. Eng. Chem.*, November 1, 1055. The use of liquid bromine for this purpose is described.

German

AMMONIA. Calculations of ammonia gas equilibria. E. Maurer. *Z. Anorg. Chem.*, October 24, 273-302. Useful data in connection with ammonia synthesis are presented.

COKE. Standardisation of coke oven plant. O. M. Schadeck. *Stahl u. Eisen*, November 6, 1349-1350.

FATS. Chemistry and industry of fats in 1914-1918. A. Grün. *Chem.-Zeit.*, November 11 and 18, 777-781, 801-804. The literature of the decomposition, analysis, extraction, and hardening of fats is reviewed. (See also CHEMICAL AGE, pp. 601, 623, 645.)

FUEL. Production of motor benzol in small and medium-sized gas works. Steding. *J. Gasbeleucht*, October 25, 635-636. Estimates of probable cost of production, profits, &c., are put forward.

FURNACES. Contribution to the study of oil-fired melting furnaces. W. Schulte. *Metall. u. Erz.*, October 22, 484-491. Part of a serial paper.

GASES. Electrical separation of solid and liquid particles from gases. R. Durrer. *Stahl u. Eisen*, November 13 and 20, 1377-1385, 1423-1430. An account of recent progress in electrostatic separation. Tables for calculating volume-reduction of gases. W. Ostwald. *Z. angew. Chem.*, November 11, 359-360. A graph for facilitating these calculations is given.

GEOLOGY. The investigation of the earth's crust and its application to mining and underground working. R. Ambronn. *Z. angew. Chem.*, November 11, 353-355.

HALOGENS. Progress of inorganic heavy chemical industries during the war. *Chem.-Zeit.*, November 8, 769-772. The literature on halogens is reviewed in this instalment. (See also CHEMICAL AGE, p. 645.)

IRON. Economy of ferro-manganese by the use of fluorspar in Martin practice. E. Goldman. *Stahl u. Eisen*, November 13, 1385-1387.

Volumetric estimation of iron. J. Houben. *Ber.*, November 8, 2072-2076. A method depending on reduction with hydrogen sulphide and subsequent titration with caustic soda is described.

MIXING. Mixing calculations. A. B. Helbig. *Chem.-Zeit.*, November 13, 786. Formulæ for calculating quantities required to produce definite mixtures are given.

MOLYBDENUM. Determination of molybdenum by means of xanthogenic acid. J. Koppel. *Chem.-Zeit.*, November 11, 777-778.

STEEL. Steels for use in substitution for chrome-nickel steels. E. Kothny. *Stahl u. Eisen*, November 6, 1341-1348. The use of chrome steels and manganese steels for the purpose is recommended.

SULPHURIC ACID. Sulphuric acid and glycerine industries during the war. R. Reik. *Oesterr. Chem. Zeit.*, September 15, 140-142. The expansion of these industries in Austria-Hungary during the war is recorded.

VISCOSIMETRY. Technique of the determination of the viscosity of organic colloids. E. Rothlin. *Biochem. Zeits.*, vol. 98, 34-91.

WOOD. The constituents of woods which give rise to colour. H. Wichelhaus. *Ber.*, November 8, 2054-2056.

XYLOL. Contributions to the knowledge of hydrocarbons. J. Tausz. *Z. angew. Chem.*, November 18, 361-363. The analogy between mineral oil xylols and coal-tar xylols is dealt with.

Miscellaneous

ANALYSIS. Gas-analytical separation of acetylene, ethylene, and benzene. W. D. Treadwell and F. A. Tauber. *Helv. Chim. Acta*, December 1, 601-607. The method involves the use of different mercury salts.

Estimation of ferrous salts. I. M. Kolthoff. *Pharm. Weekblad*, November 22, 1565-1568.

The theory of electrometric titration. W. D. Treadwell. *Helv. Chim. Acta*, December 1, 672-680.

Contribution to the study of electrometric titration. W. D. Treadwell and L. Weiss. *Helv. Chim. Acta*, December 1, 680-697. Experiments on the titration of a number of different ions are described.

ELECTROLYSIS. Comparative experiments on the electrolysis of alkali chlorides. E. Briner, A. Tykociner, and B. Alfimoff. *Helv. Chim. Acta*, December 1, 666-672. Tests with sodium, potassium, and lithium chlorides are recorded.

HYDROCYANIC ACID. The fixation of nitrogen as hydrocyanic acid by means of the electric arc. E. Briner and A. Baerfuss. *Helv. Chim. Acta*, December 1, 663-666. The experiments were made with mixtures of nitrogen and methane, hydrogen being added in some cases.

World's Production of Aluminium

OWING to the demand for aluminium during the war the world production rose from 78,790 tons in 1913, to 173,500 in 1917. The increase was greatest in the United States where the output rose from 30,000 tons in 1913, to 90,000 in 1917. France previously furnished most bauxite, and the United States came second, but during the war the latter trebled its output. Large deposits were found in British Guiana, and the bulk of the ore obtained was sent to the Northern Aluminium Co. of Canada, and was reduced at the works near the Shawinigen Falls, Quebec. In 1917 the output of these works was 12,000 tons of aluminium, and owing to the low cost of this water power, much of the United States ore was treated in Canada.

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts o Complete Specifications

120,726. Gas Analysing Apparatus, Registering Mechanism for. Aktiebolaget Ingeniorsfirma F. Egnell, 20, Norra Bantorget, Stockholm. International Convention date (Sweden), November 8, 1917.

The apparatus is of the type in which the gas is passed through an absorption vessel and the residue passed into a measuring bell, the vertical movement of which is indicated on a scale which shows the percentage of gas absorbed. As a rule the apparatus is constructed so as to indicate a maximum of 20 per cent. of gas (*e.g.*, carbon dioxide) absorbed. In this invention the measuring bell is adapted to be given a measured initial vertical displacement, so that the same indicating scale may be used to indicate a higher percentage of gas absorbed.

122,167. Benzene, Process for the Catalytic Oxidation of. The Barrett Co., 17, Battery Place, New York (*Assignees of J. M. Weiss*, 210, *West 110th Street, New York, and C. R. Downs, Cliffside, N.J., U.S.A.*) International Convention date (U.S.A.), January 5, 1918.

A mixture of benzene vapour and air is passed through a tube partly filled with fine pumice impregnated with any oxide of vanadium—*e.g.*, the dioxide, heated to a temperature above 300°C., but below 700°C. Maleic acid is the principal product, together with formaldehyde and carbon dioxide.

134,555. Sulphur Dioxide, Process for the Removal and Recovery of, from Gases which Contain the Same. Norddeutsche Hütte Aktiengesellschaft, Bremen-Oslebshausen, Germany, and J. Behrens, 14, Richtweg, Bremen, Germany. Application date, February 15, 1916.

Coal gas, when freed from sulphuretted hydrogen by treating it with gaseous or dissolved sulphur dioxide, contains a residue of sulphur dioxide. Such gas, freed also from ammonia, is washed with a cold solution of alkali sulphite, which has previously been boiled, and the sulphur dioxide is absorbed with formation of the bisulphite. The solution is subsequently boiled to recover the sulphur dioxide.

134,562. Ammonium Nitrate, Manufacture of. J. R. Partington, School Lane, Lostock Gralam, Cheshire, and G. J. Jones, University College, Gower Place, London, W.C. 1. Application date, February 1, 1918.

Ammonium nitrate is formed as a fume or mist in any suitable manner, and the fume is passed through a dehydrating agent such as strong sulphuric acid. In these circumstances, practically no reaction occurs between the nitrate and the sulphuric acid beyond the absorption of moisture. The dried fume is then much more readily condensed and collected.

134,563. Shellac, Resin, or the Like, Production of Synthetic. W. T. Robinson-Bindley, 158, Worple Road, Wimbledon, London, S.W. 19; A. W. Weller, 240, Oxford Street, London, W. 1; and E. Dulcken, 10, Christchurch Avenue, Brondesbury, London, N.W. Application date, February 27, 1918.

Hydrochloric acid is mixed with formaldehyde and the mixture added to meta or para-cresol. The temperature is raised to 80°C., and heating is stopped when a viscous mass separates from the mixture. The mass is washed with steam at about 120°C., and dried in a vacuum. To increase the toughness of the product, it may be heated in an autoclave to 140°C. at a pressure of 100 lb. per square inch. When meta-cresol is used the product is a shellac substitute soluble in spirit, and when para-cresol is used the product is soluble in oil.

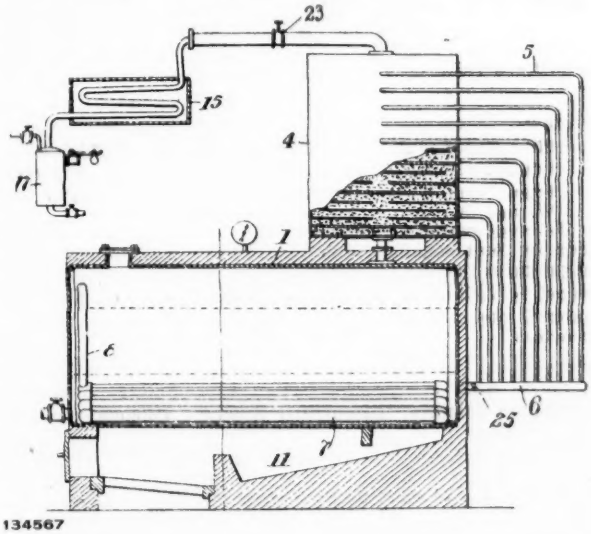
134,564-5. Celluloid, Vulcanite and the Like, Production of Substitutes for. W. T. Robinson-Bindley, 158, Worple Road, Wimbledon, London, S.W. 19; A. W. Weller, 240, Oxford Street, London, W. 1; and E. Dulcken, 10, Christchurch Avenue, Brondesbury, London, N.W. Application date, February 27, 1918.

134,564. Ortho- meta or para-cresol is volatilised in a current of steam, mixed with formaldehyde vapour, and passed over sodium sulphite heated to 60°C.—90°C., while at a pressure of 10 lb.—20 lb. per square in. The product is condensed, and the surplus reagents are withdrawn for further use. Alternatively, liquid cresol may be heated to about 60°C., and formaldehyde vapour or solution passed into it in the presence of the sulphite, when a viscous mass is formed. The product may be hardened by heating it to 60°C.—80°C. without pressure for some time, or to 140°C.—160°C. at a pressure of 200 lb. per square inch. The final product is insoluble in acids, spirits, oils or petrol.

134,565. Any of the materials produced according to specifications 134,563 and 134,564 (above) are mixed with nitro-cellulose or cellulose acetate or mixtures of these, and camphene, or celluloid and camphene. The resulting product may be made into thin sheets, is an electric insulator, and is much less inflammable than ordinary celluloid.

134,567. Petroleum and the Like, Method of and Apparatus for Distilling. E. C. R. Marks, London. (From Cleveland Trust Co., Cleveland, Ohio, U.S.A.) Application date, April 24, 1918.

Crude petroleum is heated in a still 1, by means of a furnace 11, and light gasolene is distilled off at atmospheric pressure, and passes through the tower 4 and valve 23 to the condenser 15, where it is condensed, and thence to the receiver 17. The valve 23 is then closed, and the temperature in the still raised to 650°F.—850°F., and pressure to 25 lb.—140 lb. per square



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inch according to the oil used. The lightest components are distilled first and pass in a tortuous path through the tower 4, which is provided with horizontal baffles and packed with inert material. The condensate is returned through the pipes 5 and 6 to the still. As the cracking temperature is reached the gaseous products collect in the upper part of the tower 4, and pipes 5, which are thereby cooled, and communication is then opened with the condenser 15. The light gasolene products are collected in a receiver 17, and the heavier products are con-

densed in the tower 4 and returned by the pipes 5, 6 to the coil 7, which is submerged in molten lead in the bottom of the still. The temperature of the lead is higher than that of the main body of crude oil, and the condensate is cracked in passing through the coil 7, and the products delivered through the open pipe 8 into the still above the liquid level. A non-return valve 25 is normally maintained closed by the pressure in the pipe 7, but opens automatically at intervals. The cracked vapour passes again into the tower 4, and the process is continuous.

134,572. AMMONIA FROM HIGH-PRESSURE GASES, REMOVAL OF. E. B. Maxted, 63, Highgate Road, Walsall, and T. A. Smith, Westmount, Highgate, Walsall, Staffs. Application date, August 3, 1918.

The process is for the recovery of the small proportion of ammonia which has been synthetically produced in a mixture of nitrogen and hydrogen at high pressure. The gas is passed through a tower containing anhydrous cobaltous chloride heated to 120°C.—130°C., the gas being at a pressure of 200 atmospheres. The ammonia is absorbed, and is then recovered by reducing the pressure in the tower to 5 mm. of mercury. The cobalt chloride is then ready for further use. Other absorbents which form ammonia compounds possessing a suitable dissociation pressure may be employed.

134,593. CONCENTRATING SOLUTIONS, METHOD OF. H. V. Welch, 1645, Orange Street, Los Angeles, Cal., U.S.A. Application date, October 30, 1918.

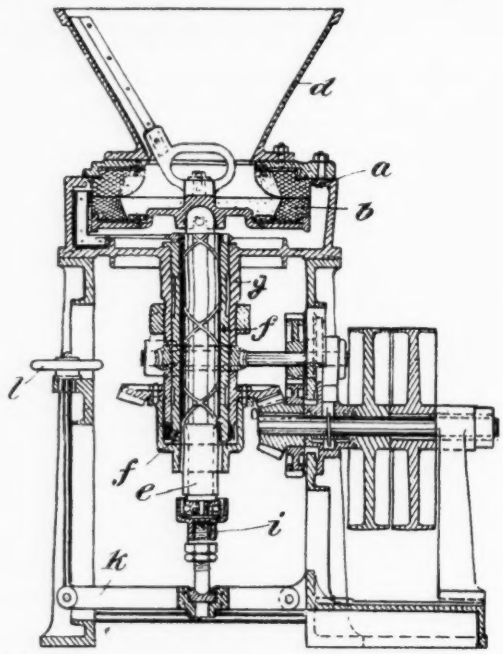
The apparatus is for the concentration of dilute acids, principally sulphuric. The dilute acid is sprayed into a chamber containing hot chequer brickwork, and is entirely evaporated. The vapour is passed into an electrical precipitator having discharge electrode wires and collecting electrode tubes, in which dust is collected. The purified vapour which is at about 300°C. is then passed into a tubular cooler, in which its temperature is reduced to 200°C. The acid condenses in the form of a fume or cloud, but the water remains principally as vapour. The mixture is then passed into another electrical precipitator, in which the concentrated acid is precipitated and collected. Another cooler and precipitator may be added to recover any acid remaining in the vapour. Sulphuric acid of 80 per cent. strength may be obtained by one precipitation, and acid of 90 per cent. strength may be obtained by cooling and precipitating at 260°C., the remainder of the acid being then recovered as a 70 per cent. solution at 170°C. The process may also be applied to the separation of more than two vaporised constituents of a liquid.

134,607. SACCHARINE MATERIALS, DECOLORISING AND PURIFICATION OF. Dr. J. J. Hood, 4, Canonbury Park North, London, N. 1; J. Clark, Elsinore, Greenway, Hutton, Essex; and P. G. Clark, 183, Oakwood Court, London, W. 14. Application date, November 4, 1918.

The crude material, which may be coloured solutions of raw cane or beet sugar, is filtered through alumina, bauxite, magnesia or magnesite. The filtering material is previously heated to dull redness and then granulated. The filtering material may be regenerated by washing and then re-heating to redness.

134,618. DISC AND LIKE GRINDING MILLS. J. R. Torrance, Bitton Foundry, Bitton, near Bristol. Application date, November 5, 1918.

The mill comprises two grinding discs *a* and *b* of stone, porcelain or metal, the upper disc being stationary. The lower disc *b* is mounted on a rotating shaft *e*, which rotates in an eccentric sleeve *f*. The sleeve rotates in a fixed bearing *g*. The details of the means for driving the shaft *e* and sleeve *f* are described, and the effect is to give a combined rotary and lateral bodily movement to the disc *b*. The material to be ground is fed into the hopper *d*, and the grinding pressure is adjusted by means of the footstep bearing *i*, which is supported on a pivoted arm *k*, controlled by the hand-wheel *l*. Means are provided whereby the velocity ratio between the rotary drive and the lateral drive may be varied. The adaptation of the mill for grinding liquid materials or mixtures containing a volatile component are also described.



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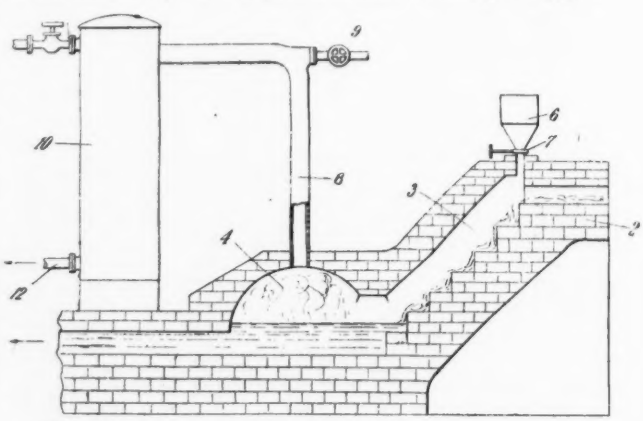
134,626. MAGNESIA, PROCESS FOR THE MANUFACTURE OF. J. C. Delage, 9, Cours de Pave des Chartrons, Bordeaux, France. International Convention date (France), November 8, 1917.

Thirty parts of sodium bisulphate are dissolved in 100 parts of water, and 20 parts of pulverised dolomite or other magnesium carbonate are slowly added. When the solution is neutral the precipitated calcium sulphate is eliminated by decanting or filtering, and the solution of double sulphate of magnesium and sodium is electrolysed. The free sulphuric acid liberated at the anode is continuously neutralised with dolomite, and magnesia is precipitated at the cathode. Alternatively, the dolomite may be treated with fused sodium bisulphate, the product washed freed from calcium sulphate and electrolysed.

134,665. POTASSIUM SALTS FROM BLAST FURNACE SLAG, RECOVERY OF. E. Bury, O. Ollander, T. Smith and F. Bainbridge, Skinningrove Iron Co., Ltd.'s, Works, Saltburn, Yorks. Application date, December 3, 1918.

Molten slag flows from the furnace by the conduit 2 to the cascade 3 formed of brickwork steps over which the slag flows. Calcium chloride is discharged from the hopper 6 through the regulating valve 7, on to the molten slag. Intimate mixture is effected by the cascade and potassium chloride vapour is formed in the chamber 4. The vapour is drawn off through the pipe 8



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by the steam jet 9 to the scrubbing tower 10, into which water is passed. The solution of potassium salts is discharged through the outlet 12. In a modification, two streams of slag meet, and are discharged on to a cascade, the calcium chloride being added at the meeting point.

134,715. SULPHONATES OF AROMATIC HYDROCARBONS FOR USE IN MAKING PHENOLIC BODIES, MANUFACTURE OF. F. Cobellis, 7, Moore Apartments, State Street, Charleston, W. Va., U.S.A. Application date, February 6, 1919.

Benzene is sulphonated with strong sulphuric acid, and the mixture of sulphuric and benzene-sulphonic acids in solution is neutralised with zinc oxide. The resulting solution of zinc sulphate and zinc benzene-sulphonate is mixed with an equivalent of barium sulphide, producing a precipitate of zinc sulphide and barium sulphate which is useful in the manufacture of paints. The barium benzene-sulphonate may be used to produce phenol in the known way. Resorcinol, naphthol, xylenol, &c., may be similarly manufactured.

134,766. LIQUID FUEL. E. C. R. Marks, London. (From United States Industrial Alcohol Co., 27, William Street, New York.) Application date, April 30, 1919.

The fuel is composed of equal parts of petroleum distillate such as gasolene and ethyl alcohol, together with 0.02 to 0.04 parts of castor oil. In place of castor oil, other oils containing esters of the hydroxy fatty acids or the hydroxy fatty acids obtained from such oils may be used—*e.g.*, ricinoleic acid.

International Specifications not yet Accepted

133,288. MOTOR SPIRIT. Dayton Metal Products Co., Taylor Street, Dayton, Ohio, U.S.A. (*Assignees of T. Midgley, 127, North Ludlow Street, Dayton, Ohio, U.S.A.*) International Convention date, October 4, 1918.

Naphthene compounds such as cyclohexane, cyclopentane or cycloheptane are used as fuel for internal combustion engines, and are suitable for unusually high compression engines.

133,304. ALIPHATIC NITRITES. P. R. de Wilde, France. International Convention date, September 28, 1918.

Ethyl, butyl, isobutyl, propyl, &c., nitrites are prepared by treating the alcohols with nitric acid and sulphur dioxide. The alcohol may be saturated with sulphur dioxide and added to nitric acid, or the alcohol may be dissolved in nitric acid and a solution of sulphur dioxide added or a stream of sulphur dioxide passed through it. The preparation of isobutyl nitrite is described.

133,319. ZINC CHLORIDE. C. F. Burgess Laboratories, Madison, Wis., U.S.A. (*Assignees of O. W. Storey, Madison, Wis., U.S.A.*) International Convention date, September 26, 1918.

Zinc scrap, spelter, galvanising dross, and alloys with a high zinc content are treated in a tower with chlorine, while water percolates through the material. Impure or dilute chlorine may be used. If electrolytic chlorine containing hydrogen is used, air may be added to avoid explosion. The resulting solution containing zinc chloride is passed over zinc to remove metals such as cadmium, lead, copper, tin or antimony. Iron is precipitated as hydrate.

133,320. WASHING PHOSPHATES, ORES, &C. C. Poupart, Seine-et-Oise, France. International Convention date, June 20, 1917.

The apparatus is for separating phosphates or other ores or materials from fine matter or gangue. A horizontal endless belt is supported on central transverse horizontal rollers and short upwardly inclined side rollers, so that its edges are upturned, and the material is washed successively on a number of such belts which are vertically shaken at the same time. A roller at one end of the belt is vertically adjustable to vary the depth of water on the belt, and the belt then passes downwards over straight rollers to discharge the washed material.

LATEST NOTIFICATIONS.

135,815-6-7-8-9-135,820. Electro-osmotic Apparatus for Removing Liquids from Substances. Elektro-Osmose Akt.-Ges. (*Graf Schwerin Ges.*). October 20, 1917.

135,831. Soda, Process of Manufacturing. T. Nishigawa. November 29, 1918.

135,844. Fine Ores, Treatment of. Dorr Co. August 16, 1918.

135,847. Calcareous cyanamide, Process of Granulating—to enable it to be employed as an Ammonia-Potassic Fertiliser. P. Saves. November 26, 1918.

135,854. Hydrocarbons, Process of Conversion of. R. Fleming. November 17, 1916.

135,855. Condensing and Treating Distillates, Process for. R. Fleming. March 25, 1918.

Specifications Accepted, with Date of Application

118,627. Ores, Concentration of. W. A. Scott. August 17, 1917.

121,282. Electrodes of Electric Furnaces. Soc. Electro-Metallurgique Française. December 3, 1917.

127,236. Filters. G. Giovannoni. May 22, 1918.

129,637 Ammonia, Method of Purifying the Gases intended for the Synthetic Production of. L'Air Liquide, Soc. Anon. pour L'Etude et L'Exploitation des Procedes G. Claude. February 15, 1918.

132,771. Separating a Salt from its Solution by Evaporation, Process of and Apparatus for. P. Piccard. September 14, 1918.

134,884. Magnesium Sulphate, Manufacture of. E. E. Dutt and P. C. Dutt. October 18, 1918.

134,885. Atmospheric Nitrogen, Process for Effecting the Fixation of, in a Blast Furnace. E. W. Haslup. October 24, 1918.

134,891. Tungstic acid from ores containing the Same, Recovery of. Imperial Trust for the Encouragement of Scientific and Industrial Research and O. J. Stannard. November 6, 1918.

134,901-2. Hydrogen Generators. A. R. Griggs. November 9, 1918.

134,920. Potassium Compound, Process for Recovering, in Connection with Cement Manufacture. A. Mond. (*International Precipitation Co.*) November 13, 1918.

134,943. Sulphur Dioxide, Treatment of Gases Containing. E. V. Espenhahn. November 15, 1917.

134,966. Centrifugal Separators. R. A. Sturgeon. November 22, 1918.

135,052. Lead and Tin, Recovery of, from their Solutions. W. G. Rumbold. January 28, 1919.

135,125. Electrolytic Copper, Process for Manufacturing Pure, from Cement Copper. A. G. Sundberg and T. E. Thomasson. May 6, 1919.

135,141. Alkaline Chloride Solutions which are to be Electrolysed, Process for the Purification of. C. N. Riiber. June 12, 1919.

Patents Court Cases

OFFICIAL announcement is made of the grant of licences by the Public Trustee under the Trading with the Enemy Acts, 1914 to 1918, to Aberthaw and Rhoose Portland Cement and Lime Co., Ltd., in respect of the following Patents:—17,145/1914, E. C. R. Marks (G. Polysius) and 17,146/1914, G. Polysius. These relate to rotary kilns for treating ores, &c.

Profiteering Committee and Linseed Prices

THE Walsall Profiteering Committee recently considered a complaint by Ralph Wilson, of Cobden Street, Wednesbury, against Needham's, Ltd., of Walsall, of trying to obtain an excessive price on the sale of linseed. It was stated by the complainant that Needham's price for whole linseed was 1s. per lb., that at other chemists' shops in Walsall 8d. and 8½d. was charged, but that at Darlaston he purchased at 6d. per lb. At Needham's Darlaston Branch 8d. per lb. was charged. Mr. Cooper, for the firm, relied on the sub-section of the Act, which stipulated that the rate of profit which did not exceed the average made before the war should not be deemed unreasonable. In respondents' Walsall shop there were 4,000 various articles on sale, and it was impossible to decide upon 33⅓ or 50 per cent. as an all-round profit, because many proprietary articles had to be sold at a narrow profit margin. The linseed in question was purchased wholesale in September at 7·07d. per lb., and to-day's market price was 8·03d. per lb. The percentage of profit on sale price was 41·25 against 52 per cent. in pre-war days, when linseed could be bought at 18s. per cwt. Linseed was bought in Birmingham at 1s. per lb. The committee found that there was no ground for the complaint. They were of opinion, however, that the variation of prices at different shops was very confusing to the public.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

THURSDAY, DECEMBER 11, 1919.

Business continues very active, and the market is extremely firm with an upward tendency. Export demand is very strong, but in many cases buyers' requirements cannot be accommodated.

A further slump in the French exchange has retarded business in that market somewhat, although we are of opinion that this will only be of a temporary nature. At the same time, however, it makes it very difficult to conclude any large transactions satisfactorily.

General Chemicals

ACETIC ACID is very firm, and shows a slight advance on the week.

ACID CARBOLIC is also firm, and is higher in price.

ACID FORMIC is without nominal change in value.

ACID OXALIC is extremely scarce, and supplies of foreign material seems to have ceased for the time being.

AMMONIUM SALTS are all extremely active, and a further advance in price appears to be imminent.

ARSENIC remains in short supply, and price has again advanced.

BARIUM SALTS are in slightly better demand, especially for chloride, and it would seem as if the recent low values obtained for this product have tempted buyers somewhat.

BLEACHING POWDER is extremely scarce for near delivery, and the price has now been fixed for next year.

FORMALDEHYDE.—A few parcels are reported as being afloat, but these all appear to be sold.

IRON SULPHATE is in slightly better demand, but fair supplies are obtainable.

LEAD SALTS are much more active, and the price is very firm. White acetate in particular is moving off steadily.

POTASSIUM CHLORATE is slow of sale and lower in price.

POTASSIUM PRUSSIATE is again firmer, and available supplies of foreign material seem to be more restricted.

SODIUM ACETATE is a little more active and without change in price.

SODIUM CAUSTIC is steady at recent figures, although a certain amount of export business appears to have been diverted to America.

SODIUM HYPOSULPHITE is scarce and firm at last quoted price.

SODIUM NITRITE is practically unobtainable on the spot, and higher prices have been paid for near delivery.

SODIUM PHOSPHATE is steady, with moderate business passing.

SODIUM PRUSSIATE is, perhaps, not quite so active, but the price is well maintained.

SODIUM SULPHIDE is a trifle higher.

ZINC SALTS are moderately active without change in value.

Coal Tar Intermediates

This market continues to show strength, and prices are advancing in many directions. Makers, however, in the majority of cases, are now very fully occupied well ahead, and it is practically impossible to place fresh business except on the basis of delivery well into 1920. American manufacturers appear to be more or less in the same position.

ANILINE OIL shows a further advance, and there is an insistent demand on the market.

BENSALDEHYDE is a shade firmer, with better business passing.

BETA NAPHTHOL is nominally slightly higher in price, but nothing like early delivery can be obtained, and makers would appear to be behind with their deliveries.

DIMETHYANILINE is in slightly better demand, and prompt delivery is still possible in this product.

NAPHTIONATE OF SODA is wanted for near delivery, and the price is inclined to be firmer.

Coal Tar Products

The market is still firm and fairly active. Supplies are scarce, and deliveries difficult to obtain.

90 PER CENT. BENZOL is in very fair demand, and the price is about 2s. 1½d. to 2s. 2d. f.o.r.

CRESYLIC ACID is also in fair demand, the price showing an upward tendency. Business is being hampered by exorbitant prices being asked for forward delivery; 2s. 9d. f.o.r. for 97/99 per cent., with 95/97 per cent. at 2s. 4½d.

CREOSOTE OIL is in very fair demand for export, but supplies available for prompt shipment are practically nil. There is no change in the price.

NAPHTHALENE remains firm at £18 to £20 per ton for the refined; for the crude, £7 10s. to £9.

SOLVENT NAPHTHA appears to be slightly easier. There are more sellers in the market, and the price is in the region of 2s. 7½d. to 2s. 8d.

HEAVY NAPHTHA is slightly more active within the last week, but the price remains at 2s. 4½d.

PITCH.—The market is firm, with an improved demand. 85s. has been paid in London, and 82s. 6d. f.o.b. East Coast ports.

Sulphate of Ammonia

There is no change to report in the position.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	9	to	0	3	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	83	0	0	to	85	0	0
Acetic, 80% pure	ton	65	0	0	to	67	10	0
Carbolic, cryst. 39-40%	lb.	0	0	9½	to	0	0	10
Citric	lb.	0	4	3	to	0	4	4
Formic, 80%	ton	105	0	0	to	110	0	0
Lactic, 50 vol.	ton	70	0	0	to	72	0	0
Lactic, 60 vol.	ton	85	0	0	to	87	10	0
Oxalic	lb.	0	1	5½	to	0	1	6½
Acid, Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	3	2	to	0	3	3
Alum, lump	ton	19	0	0	to	19	10	0
Aluminium, sulphate, 14-15%	ton	15	0	0	to	15	10	0
Aluminium, sulphate, 17-18%	ton	18	10	0	to	19	0	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	7½	to	—		
Ammonia, muriate (galvanisers)	ton	47	0	0	to	49	0	0
Ammonia, nitrate	ton	45	0	0	to	50	0	0
Ammonia, phosphate	ton	115	0	0	to	120	0	0
Arsenic, white, powdered	ton	62	0	0	to	64	0	0
Barium, carbonate, 92-94%	ton	13	0	0	to	14	0	0
Chloride	ton	21	0	0	to	22	0	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	17	10	0	to	18	0	0
Borax crystals	ton	39	0	0	to	40	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Chloride	ton	9	0	0	to	9	10	0
Casein, technical	ton	80	0	0	to	83	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper, sulphate	ton	42	0	0	to	43	0	0
Cream Tartar, 98-100%	ton	245	0	0	to	250	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	170	0	0	to	175	0	0
Iron perchloride	ton	40	0	0	to	42	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	84	0	0	to	86	0	0
Carbonate (White Lead)	ton	58	0	0	to	61	0	0
Nitrate	ton	62	0	0	to	63	0	0
Lithophone, 30%	ton	44	0	0	to	46	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	11	15	0	to	12	10	0
Sulphate (Druggists')	ton	17	10	0	to	18	10	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	105	0	0	to	107	0	0

	per	£	s.	d.		£	s.	d.
Potassium Chlorate	lb.	0	1	0	to	0	1	1
Meta-bisulphate, 50-52%	ton	245	0	0	to	260	0	0
Nitrate, refined	ton	60	0	0	to	62	0	0
Permanganate	lb.	0	3	6	to	0	3	9
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	1	11	to	0	2	0
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	15	0	to		—	
Seconds	cwt.	4	10	0	to		—	
Sodium acetate	ton	48	0	0	to	50	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bisulphate, 60-62%	ton	32	10	0	to	33	10	0
Chlorate	lb.	0	0	6	to	0	0	6¼
Caustic, 70%	ton	25	10	0	to	26	10	0
Caustic, 76%	ton	26	10	0	to	27	0	0
Hyposulphite, commercial	ton	19	10	0	to	20	0	0
Nitrite, 96-98%	ton	62	10	0	to	65	0	0
Phosphate, crystal	ton	37	0	0	to	38	0	0
Prussiate	lb.	0	1	1	to	0	1	1½
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium, carbonate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	38	0	0	to	40	0	0
Tin perchloride, 33%	lb.	0	2	5	to	0	2	6
Protochloride (tin crystals)	lb.	0	1	9	to	0	1	10
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Sulphate	ton	21	0	0	to	22	10	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	7	to	0	2	9
Aniline oil, drums free	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	6	to	0	7	0
Benzidine, base	lb.	0	7	6	to	0	8	0
Benzidine, sulphate	lb.	0	6	6	to	0	7	0
Benzoic, acid	lb.	0	5	3	to	0	5	6
Benzoate of soda	lb.	0	5	3	to	0	5	6
Benzyl chloride, technical	lb.	0	2	3	to	0	2	6
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	9	to	0	3	0
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	6
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	7	6
Dinitrobenzol	lb.	0	1	2	to	0	1	3
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	7	to	0	1	8
Dinitrophenol	lb.	0	1	3	to	0	1	6
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	11	6	to	0	12	6
Metaphenylenediamine	lb.	0	4	9	to	0	5	0
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	3	6	to	0	3	9
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	3
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6
Paranitrophenol	lb.	0	1	10	to	0	2	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	9	0	to	0	10	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	1	7	6	to	1	10	0
Salicylic acid	lb.	0	2	9	to	0	3	9
Salol	lb.	0	4	9	to	0	5	6
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	9	6	to	0	10	6
Tolidine, mixture	lb.	0	2	9	to	0	3	0

Alsatian Potash Imports

Imports for the week ending December 6, 2,588 tons Sylvinite, 14 per cent. *Prices.*—Sylvinite, 14 per cent. (French Kainit), £7 per ton; Sylvinite, 20 per cent. (French potash salts), £8 7s. 6d. per ton; Muriate of Potash, 80 per cent., £19 7s. 6d. per ton.

Prices of German Fertilisers

Questions in Parliament

In reply to a question by Sir N. Griffiths (House of Commons December 8) with regard to the importation of certain fertilisers from Germany and their present retail prices, the following information has been circulated by Sir Arthur Boscawen:

I am informed that no sulphate of ammonia, ground basic slag or superphosphate is being imported from Germany. The present maximum prices of the respective fertilisers are:—

Sulphate of Ammonia.—For sale in lots of not less than 2 tons for delivery by rail or water to purchaser's nearest railway station or wharf in Great Britain, less a trade discount to agricultural merchants, dealers and co-operative societies:—

Month of delivery.	Price per ton in bags. Net cash.
December, 1919	£21 0 0
January, 1920	21 7 6
February	21 15 0
March, April and May	22 0 0

Basic Slag.—The maximum prices range from 62s. per ton for slag containing 12 to 14 per cent. total phosphates to 102s. per ton for slags containing 42 to 44 per cent. total phosphates. The prices include delivery in makers' bags to purchaser's nearest station or wharf for minimum lots of 4 tons.

In the case of both sulphate of ammonia and basic slag the prices given include, in deliveries to Ireland, Isle of Man or Channel Islands, delivery f.o.b. port in Great Britain.

Superphosphate.—Owing to the varying cost of importing phosphate rock it has not been possible to arrange for superphosphate to be sold at a uniform delivered price. During the 1918-19 season phosphate rock and other materials were sold to superphosphate makers by the Government at less than market prices. This assistance has been discontinued. The present quotations for 30 per cent. superphosphate are from £7 5s. to £7 7s. 6d. per ton free on rail.

Sir N. Griffiths: What, if any, profit is the Government making per ton on basic slag now being sold at fixed prices ranging from 62s. per ton for 12 per cent. up to 102s. per ton for 42 per cent. of total phosphates; and what proportion, if any, of such basic slag is made up out of material obtained from Germany?

Sir A. Boscawen: No basic slag is sold by the Government, nor do they profit by the sales made by makers. I am informed that no raw slag is being obtained from Germany.

Mr. Hohler asked the Parliamentary Secretary to the Ministry of Munitions whether the Government, directly or indirectly, controls the supply and the price of sulphate of ammonia, basic slag, and superphosphate; will he state the average price per ton paid for each of these fertilisers by the Government from April 1 to September 30 last, the average price at which they were sold during the like period to the merchant or factor, and the price the merchant or factor was authorised to charge the consumer; did the Government make any and what profit during the above period by dealing in the above fertilisers; and will he give the average profit per ton?

Mr. Hope: The Ministry of Munitions does not control the supply of the fertilisers referred to; the prices at which they could be sold up to May 31 last were fixed by the Fertilisers Prices Order, 1918. The Ministry has never had any trading transactions in superphosphates or basic slag; but at the date of the Armistice it had small stocks of sulphate of ammonia, which have since been sold.

PROFESSOR H. B. DIXON, of Manchester University, in the course of a lecture at the Midland Institute, Birmingham, on "High Explosives in Theory and Practice," said that tri-nitro-toluene, commonly called T.N.T., had never been made in quantity in England before the war. Its pulverising power, too powerful for many purposes, was diluted down with ammonium nitrate; and the mixture amatol became in the end the standard high explosive, though other mixtures were used sometimes with metallic powders where large flames were needed.

Company News

BRAZILIAN TRACTION, LIGHT AND POWER.—Quarterly dividend of 1½ per cent. on cumulative preference shares, payable Jan. 1 to holders of record Dec. 15.

PACIFIC PHOSPHATE.—Interim dividend on the Ordinary share capital in respect of the half-year ended June 30, at the rate of 5 per cent. per annum, payable December 24, the same as a year ago.

WEARDALE LEAD.—At the ordinary general meeting held in London last week, Mr. E. P. Deas (chairman) presiding, a final dividend was declared of 5 per cent., making 7½ per cent. for the year, free of income tax.

DOMINION STEEL.—Dividend at the rate of 1½ per cent. on the Common shares, payable Jan. 1, to holders of record on Dec. 5. Coupon No. 23 of share warrants will be paid on and after Jan. 1 on presentation at the Bank of Montreal, London, or in Montreal.

MEXICAN EAGLE OIL CO.—It has been resolved to increase the capital of this company to 115,113,580 pesos by the creation of 5,755,679 Ordinary shares of 10 pesos (£1. 5s. 2d.) each, and one new share is offered at par to proprietors for every two Ordinary or Preference shares now held.

MOUNT OXIDE MINES.—The balance-sheet as at June 30, 1919, shows the following items: Debit—Issued capital, £500,000; creditors, £180; total, £500,180. Credit—Shares in Mount Elliott, Ltd., at balance of cost, £487,989; sundry expenditure, £1,469; cash at bankers, £1,037; bill receivable, £8,166; debtors, £19; 5 per cent. National War Bonds, 1922, £1,500; total, £509,180.

BRITISH COTTON AND WOOL DYERS' ASSOCIATION.—At an extraordinary general meeting held in Manchester last week a resolution to increase the capital of the company to one million sterling by the creation of 2,000,000 new Ordinary shares of 5s. each, ranking in all respects *pari passu* with the existing Ordinary shares of the Company, was unanimously adopted. The confirmatory meeting will be held on Friday, Dec. 19.

MILLON & ASKAM HEMATITE IRON.—The directors announce that, owing to the reconstruction, the accounts are delayed, but they are satisfied that last year's results will admit of a further payment of interest and a dividend on new ordinary shares of 2 4-5 per cent. free of tax, for the past half-year. Under the scheme of reconstruction recently carried out the ordinary shareholders are receiving five £1 shares for every £1 share held in the old company.

PARTINGTON STEEL AND IRON.—The directors invite applications for £300,000 6½ per cent. five-year notes at 98 per cent., redeemable at 102 per cent. on June 30, 1925 (being equivalent to a return of £7 9s. per cent. per annum on the amount invested, less tax). The notes are guaranteed unconditionally as to principal (including premium) and interest by the Pearson & Knowles Coal and Iron Company. The company has in each year since 1915 paid dividends on its ordinary shares at the rate of 10 per cent. per annum.

COURTAULDS, LIMITED.—An extraordinary meeting will be held at Winchester House, E.C., on December 15, to pass a resolution revising and extending the articles of association, and a further meeting will be held at the same place on December 30, when a resolution will be submitted for increasing the capital to £4,000,000 by the creation of 1,500,000 new shares of £1 each, all ranking pari passu with the existing shares. It is also proposed that £1,999,993 to the credit of the general reserve account be capitalised and applied to the paying up in full of the 1,999,993 shares of £1 each to be distributed among holders of existing shares.

COMMERCIAL GLASS WORKS.—The statutory report states that 300,000 cumulative participating preference shares have been subscribed and issued for cash, and the whole amount payable on application and allotment in respect of these shares has been received by the company; 200,000 cumulative participating preference shares and 500,000 ordinary shares have been allotted credited as fully paid, that is to say as to 200,000 cumulative participating preference shares and 380,000 ordinary shares to the vendors in satisfaction of the share purchase price, and as to 120,000 ordinary shares as share commission payable for the subscription of the 300,000 cumulative participating preference shares issued for cash. The balance of 500,000 cumulative participating preference shares remaining unissued will be held in reserve for issue as and when required for extension of plant, &c.

SAPON SOAPS, LTD.—An extraordinary general meeting of Sapon Soaps, Ltd., will be held at the Cannon Street Hotel, London, on December 17, to authorise an increase in the capital to £300,000, by the creation of 500,000 new Ordinary shares of 4s. each, ranking *pari passu* in all respects with the existing Ordinary shares. It is proposed to offer the new shares in the proportion of five new shares for every two Preference shares held, and one new share for every two of the existing Ordinary shares held. Negotiations are pending with a firm of soap makers in Marseilles (France) for the erection of a plant for the manufacture of soap under this company's patented process. If these negotiations are successfully completed all the capital will be found by the French company, and this company will receive a substantial interest in shares, ranking *pari passu* with the capital provided in France. This company has just announced a maiden dividend on the Ordinary shares of 2½ per cent

ELECTRO BLEACH AND BY-PRODUCTS, LIMITED.—This Company is offering for sale 80,000 preference shares of £1 each at par and a similar number of ordinary shares of 10s. each at 17s. per share. The shares are part of the recently authorised increase of capital of £300,000 to a total of £480,000, divided into 320,000 £1 preference shares and 320,000 10s. ordinary shares. Including the shares now offered the issued capital will amount to £300,000, of which £200,000 is in preference and £100,000 in ordinary shares. The preference shares are entitled to one-half of the surplus profits distributed in dividends in any year after the ordinary shares have received in dividend a sum equal in amount to the fixed dividend of 7 per cent. on the preference shares. In 1918 the ordinary shares received 12½ per cent., and for 1919 an interim dividend at the rate of 12½ per cent. has been paid. The outstanding £50,500 first mortage debentures will be repaid out of the proceeds of the present issue.

ANGLO-PERSIAN OIL.—Sir Charles Greenway presiding at the ordinary general meeting held in London on Monday referred to the company's recent issue of £10,100,000 of new capital—£4,500,000 in the form of ordinary shares, which had all been taken up at par by the former ordinary shareholders, *i.e.*, £3,000,000 by the Government and £1,500,000 by the other ordinary shareholders; £3,000,000 in six per cent. participating preference shares and £2,600,000 in five per cent. debentures, which had been offered to the public. He was unable to state the definite results of the issue owing to the enormous number of applications which had to be dealt with, but it was already evident that the preference shares would be very largely over-subscribed, although the applications for the debenture stock were somewhat disappointing. The folloiwng dividends were declared:—A participating dividend at the rate of 2 per cent. per annum, less income-tax, to be paid on the preference shares in respect of the year ended March 31, 1919, such dividend to be paid together with the dividend at the rate of 6 per cent. per annum for the half-year ended on September 30 last, payable on January 31, 1920; and a dividend at the rate of 10 per cent. per annum, free of income-tax to be paid on the ordinary shares in respect of the year ended March 31, 1919, also to be paid on January 31, 1920.

Vauxhall Glass Manufacturing Co.

Issue of £44,500 New Capital

THE Vauxhall Glass Manufacturing Co., Ltd., are offering for subscription next week 44,550 8 per cent. (free of income tax) cumulative participating Preference shares at par. This issue after completing the purchase price of the existing glass works as a going concern and a large freehold property for its proposed extensions will provide £21,500 working capital, and 38,500 ordinary shares will be in reserve for further issue. The subscription list opens on Wednesday, December 17, and closes on or before the following Friday, December 22.

According to the prospectus, which appears on another page, the Company has been formed to acquire the existing business of the Vauxhall Glass Works, Limited, a profitable going concern manufacturing globes, shades, &c., for gas and electric light, technically known as "illuminating glass," and to purchase a freehold estate and buildings for the purpose of erecting a number of glass furnaces, and as rapidly as possible extending the existing business, in order to cope with the contracts actually in hand and the very large orders offered to the Company. The great shortage of glass in the United Kingdom, due to the stoppage of imports from late enemy countries and the general restrictions from other countries due to to the war, &c., makes the manufacture of glass in this country a most profitable undertaking. Illuminating glass is one of the unstable "key" industries, the importation of which is prohibited by the Board of Trade. It is understood that every possible assistance and encouragement will be given to glass manufacturers in the United Kingdom by the Government.

The existing furnace, which is at present only producing gas globes and shades, took about three months to erect during the difficulties of labour, &c., under the 1918 war conditions. During the first week of working in January last it produced about £250 gross value of glass. The output has gradually augmented monthly and the furnace reached during the last three months an average of £330 gross value of glass per week, which, after the payment of all charges, shows a large available profit. Report from the Company's auditors indicates that the present profits from the one existing furnace amount to £70 per week (£3,640 per annum) which will be sufficient to pay the interest on the preference shares until completion of a new furnace, which it is estimated will take only four months to complete. During the 46 weeks of its existence £12,713 gross value of glass has been produced and sold from the one furnace. It is considered, however, that within the next twelve months three or more full-sized 8-pot furnaces can be erected, gradually increasing after that to eight furnaces. The output of the existing furnace is sold immediately on the spot to large London consumers, and the Company has contracts in hand amounting to £15,000.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 4, Queen Anne's Gate Buildings, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
British India (Calcutta)	Small Refrigerating Plants	1,142
Belgium (Liege) ...	Soap; Perfumes	1,159
Italy (Milan) ...	Asbestos; Dyes	1,163
Turkey (Constantinople)	Refrigerators	1,170
Brazil	Paints; Glassware	1,174
Australia (Brisbane)	Chemists' and Druggists' Supplies. Replies to the Official Secretary, Commonwealth of Australia, Commercial Information Bureau, Australia House, Strand, W.C.	58/7/44
Brazil (Porto Alegre)	Cement; Drugs	1,233
Belgium (Antwerp)	Chemicals. (Agency desired). Replies to the Belgian Trade and Reconstruction Section, Department of Overseas Trade, 35, Old Queen Street, S.W.1.	117,018 T. & R.
Canada (Toronto) (Ontario)	Drug Specialities; Soap Dyes ... Dyes (particularly Blues and Reds for colouring inks)	1,185
South Africa (Johnnesburg)	Druggists' Sundries	1,189
Spain (Barcelona)	Patent Food Stuffs; Patent Pharmaceutical Products.	1,226
Denmark (Copenhagen)	Essential Oils, Drugs, Waxes; Articles used in Technical Chemical factories.	1,208

The Nitrate Industry

At the thirty-sixth annual general meeting of the Liverpool Nitrate Co., Ltd., held in Liverpool last week, the chairman, Sir Robert Harvey, reviewed the difficult period through which the nitrate industry had passed since the Armistice. Nitrate of soda from being one of the first commodities to be allotted freight had become the last. Referring to the future of the industry, Sir Robert Harvey said that the present need for nitrate of soda was great and urgent, but so far as the coming season was concerned the available supply to meet the demand would be very limited. The tonnage to carry it was confined to foreign-owned vessels, as British ships had to carry other produce, and were not granted licences to load nitrate. The rate of freight for nitrate was therefore unduly high, and to the entire benefit of the foreign shipowner. He was informed that if the present restrictions were removed much lower freights for nitrate would be ruling and the position of the British shipowner benefited. Germany required an enormous amount of nitrate of soda, but owing to depreciation of the mark and the farmer having to sell his product at fixed maximum prices, it was impossible for him to use artificial fertilisers, which had to be imported. The adverse exchanges of France and Italy also tended to check the importation of fertilisers into these countries. The undoubted advantages of nitrate of soda for increasing the yield of crops had now become more widely recognised, and he hoped that the experience of the war as to the necessity for intensive cultivation, coupled with the rise in the land values and agricultural wages, had not been lost on the farmers of this country.

A final dividend was declared of 5s. per share, free of income-tax, making, with the interim dividend of 2s. paid in May last, a total distribution for the year of 7s. per share, free of income-tax.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations Dec. 3	Dec. 10.
Alby United Carbide Factories, Ord....	$\frac{13}{16}$–$\frac{15}{16}$	$\frac{13}{16}$–$\frac{15}{16}$
Associated Portland Cement Manufrs. (1900) Lim., Ord.....	25/0–26/0	24/0–25/0
Bell's United Asbestos Co., Lim., Ord.	$1\frac{9}{16}$–$1\frac{13}{16}$	$1\frac{5}{8}$–$1\frac{7}{8}$
Bleachers' Association, Lim., Ord.....	$1\frac{7}{8}$–$1\frac{15}{16}$	$1\frac{15}{16}$–$1\frac{7}{8}$
Borax Consolidated, Lim., Prefd. Ord.	4–$4\frac{1}{2}$	4–$4\frac{1}{2}$
Bradford Dyers' Assoc. Lim., Ord.....	$2\frac{5}{8}$–$2\frac{3}{4}$	$2\frac{5}{8}$–$2\frac{3}{4}$
British Aluminium Co., Lim., Ord.....	$1\frac{1}{2}$–$1\frac{5}{8}$	$1\frac{9}{16}$–$1\frac{11}{16}$
British Oil and Cake Mills, Lim., Ord...	$1\frac{31}{32}$–$1\frac{15}{16}$	$1\frac{31}{32}$–$1\frac{15}{16}$
British Portland Cement Manufrs., Lim., Ord.	30/6–32/6	29/0–31/0
Brunner, Mond & Co., Lim., Ord.....	$2\frac{1}{16}$–$2\frac{3}{16}$	$2\frac{1}{16}$–$2\frac{3}{16}$
Castner-Kellner Alkali Co., Lim.....	$2\frac{1}{2}$–$2\frac{5}{8}$	$2\frac{5}{8}$–$3\frac{1}{8}$
China Clay Corporation, Lim., Ord.....	$\frac{1}{4}$–$\frac{3}{8}$	$\frac{1}{4}$–$\frac{3}{8}$
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.....	57–61	57–61
Courtaulds, Lim.....	$11\frac{1}{2}$–$12\frac{1}{2}$	$11\frac{1}{2}$–$12\frac{1}{2}$
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce	$\frac{15}{16}$–$1\frac{1}{16}$	$\frac{15}{16}$–$1\frac{1}{16}$
Curtis's & Harvey, Lim.....	$2\frac{9}{16}$–$2\frac{13}{16}$	69–71
Electro Bleach.....	...	21/0
Explosives Trades, Lim., Ord.....	22/6–23/6	22/0–23/0
Field (J. C. & J.), Lim., Ord.....	$1\frac{3}{8}$–$1\frac{5}{8}$	$1\frac{5}{16}$–$1\frac{7}{16}$
Greenwich Inlaid Linoleum (Fredk. Walton's New Patents) Co., Lim., Ord.	$\frac{31}{32}$–$\frac{1}{32}$	$\frac{5}{8}$–$\frac{3}{4}$
Harrison & Crosfield, Lim., 10% Cum. Prefd. Ord.....	$\frac{7}{8}$–1	$1\frac{3}{8}$–$1\frac{1}{2}$
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.....	$18\frac{1}{2}$–$18\frac{3}{4}$	$18\frac{1}{2}$–19
Lawes' Chemical Manure Co., Lim., Ord.	5–$5\frac{1}{2}$	5–$5\frac{1}{2}$
Lever Bros., Lim., 6% Cum. "A" Prefce.....	19/6–20/3	19/3–20/0
Do. $6\frac{1}{2}$% Cum. "B" Prefce.....	19/9–20/6	19/9–20/6
Magadi Soda Co., Lim., Ord.....	17/3–18/3	20/0–21/0
Manganese Bronze & Brass Co., Lim., Ord.	$\frac{11}{16}$–$\frac{13}{16}$	$\frac{11}{16}$–$\frac{13}{16}$
Maypole Dairy Co., Lim., Defd. Ord....	$\frac{31}{32}$–$\frac{1}{32}$	$\frac{31}{32}$–$\frac{1}{32}$
Mond Nickel Co., Lim., 7% Cum. Pref.	$1\frac{1}{16}$–$1\frac{3}{16}$	$1\frac{1}{16}$–$1\frac{3}{16}$
Do. 7% Non. Cum. Pref.....	$\frac{7}{8}$–1	$\frac{7}{8}$–1
Pacific Phosphate Co., Lim., Ord.....	$4\frac{13}{16}$–$5\frac{1}{16}$	$4\frac{1}{2}$–5.
Power-Gas Corporation, Lim., Ord.....	$\frac{11}{16}$–$\frac{13}{16}$	$\frac{11}{16}$–$\frac{13}{16}$
Price's Patent Candle Co., Lim.....	91–96	91–96
Salt Union, Lim., Ord.....	32/0–34/0	$1\frac{15}{32}$–$1\frac{17}{32}$
United Alkali Co., Lim., Ord.....	$1\frac{1}{4}$–$1\frac{1}{2}$	$\frac{1}{4}$–$1\frac{1}{2}$
Val de Travers Asphalte Paving Co., Lim.	$\frac{7}{8}$–1	$\frac{7}{8}$–1
Van den Berghs, Lim., Ord.....	$3\frac{3}{8}$–$3\frac{5}{8}$	$3\frac{1}{2}$–$3\frac{3}{4}$
Walkers, Parker & Co., Lim.....	$1\frac{1}{4}$–$1\frac{3}{8}$	$1\frac{3}{16}$–$1\frac{5}{16}$
Welsbach Light Co., Lim.....	$2\frac{3}{8}$–$2\frac{5}{8}$	$2\frac{3}{8}$–$2\frac{5}{8}$

Gas, Iron, Coal and Steel

Gas Light and Coke Co., Ordinary Stock (4% Stand.).....	33/0–34/0	59–62
South Metropolitan Gas Co., Ordinary (4% Stand.).....	$1\frac{3}{16}$–$1\frac{1}{4}$	60–63
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.....	64–67	23/6–24/6
Hadfield's, Limited, Ordinary.....	38/0–40/0	37/6–39/6
Staveley Coal & Iron Co., Lim., Ord....	64–67	$1\frac{11}{16}$–$1\frac{13}{16}$
Vickers, Limited, Ordinary.....	$1\frac{11}{16}$–$1\frac{13}{16}$	$1\frac{3}{4}$–$1\frac{11}{16}$
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.....	33/0–34/0	31/6–32/6

Mines, Nitrate, &c.

Rio Tinto Co., Lim., Ord. (Bearer).....	$14\frac{1}{2}$–$15\frac{1}{2}$	41–43
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) $5\frac{1}{2}$% 1st. Mt. Debs. Red.....	88–93 × d	85–90 × d
Lagunas Nitrate Co., Lim.....	1–$1\frac{1}{4}$	1–$1\frac{1}{4}$
Tarapaca & Tocopilla Nitrate Co., Lim.	45–47	14–16
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.....	14/0–16/0	$14\frac{1}{2}$–$15\frac{1}{2}$

Oil and Rubber

Anglo-Persian Oil Co., Lim., Cum. 6% Part.....	7/6–8/0	$1\frac{3}{16}$–$1\frac{5}{16}$
"Shell" Transport and Trading Co., Lim., Ord.....	$\frac{3}{8}$–$\frac{1}{2}$	$9\frac{5}{8}$–$9\frac{7}{8}$
Do. 5% Cum. Pref.....	13/6–14/0	$8\frac{1}{2}$–9
Anglo-Java Rubber & Produce Co., Lim	$1\frac{3}{16}$–$1\frac{5}{16}$	7/3–7/9
Anglo-Malay Rubber Co., Lim.....	$16\frac{3}{4}$–$17\frac{1}{4}$	13/3–13/9
Chersonese (F.M.S.) Estates, Lim.....	4/0–4/3	3/10½–4/1½
Linggi Plantations, Lim., Ord.....	...	$3\frac{1}{16}$–$3\frac{3}{16}$
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	$14\frac{1}{4}$–14	$12\frac{31}{32}$–$12\frac{15}{16}$
Anglo-Maikop Corporation, Ltd., Ord.	$10\frac{1}{2}$–$10\frac{3}{4}$	$\frac{7}{8}$–$\frac{7}{16}$
Burmah Oil Co., Ltd., Ord.....	9–$9\frac{1}{4}$	$16\frac{7}{8}$–$17\frac{3}{8}$

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

WHITE, FREDERICK WILLIAM (trading as F. White & Co.), 298A, Commercial Road, and 48, All Saints' Road, Portsmouth, Hants, oil and colour merchant. First meeting, December 15, 12 noon, Official Receiver's Offices, Cambridge Junction, High Street, Portsmouth. Public examination, January 5, 11 a.m., Court House, St. Thomas's Street, Portsmouth.

Partnerships Dissolved

DAWSON, ARTHUR, DAWSON, JOHN ARTHUR, DAWSON, ALBERT WILLIAM and HARDING, ADA, disinfectant manufacturers, &c., 226, Belgrave Gate, Leicester, under the style of A. Dawson & Sons, by mutual consent as and from June 30, 1919. All debts received and paid by Arthur Dawson, John Arthur Dawson and Albert William Dawson.

GARDNER, ROBBY, and WEDDELL, DOUGLAS JAQUES, chemists, 135, Coatsworth Road, Gateshead, Durham, under the style of Gardner & Weddell, by mutual consent as and from November 27, 1919. All debts received and paid by Douglas Jaques Weddell.

Notice of Dividend

RIDGWAY, JOHN ALFRED, residing at Clifton Villa, Stamford Road, Mossley, Lancs, works chemist. 4/1½d. first and final. December 8. Official Receiver's Office, Byrom Street, Manchester.

Order Made on Application for Discharge

SWITHENBANK, HAROLD, 53, High Street, Langley, near Birmingham, lately residing at 132, Beeches Road, West Bromwich, Staffs, analytical chemist. Discharge refused. Date of order, November 11, 1919.

Companies Winding Up Voluntarily

BENGAL IRON & STEEL CO., LTD.—Liquidator, C. E. Rutter, 17, Victoria Street, London, S.W.1.

ISLE OF WIGHT CEMENT WORKS, LTD. (in voluntary liquidation).—A general meeting will be held at 8, Paternoster Row, London, on Monday, January 12, 1920, at 12 o'clock noon. R. Ewart Crane, Liquidator.

LIQUID PURIFICATION CO., LTD.—Liquidator, C. G. Baron, 15, Copthall Avenue, E.C., Chartered Accountant.

THE MINBU OIL COMPANY OF BURMA, LTD. (in voluntary liquidation).—A general meeting of members will be held at 175, West George Street, Glasgow, December 30, at 3 p.m. R. M Edington, Liquidator.

Liquidators' Notices

BOUNDARY CHEMICAL CO., LTD.—A general meeting of members will be held at 31, North John Street, Liverpool, Tuesday, January 13, 1920, at 11 a.m. Harold Sadler, Liquidator.

HAY'S WATERPROOF GLUE AND NEW PATENT ENAMEL COMPOSITION & VARNISH CO., LTD.—A general meeting of members will be held at 24A, Commercial Road, Portsmouth, on Wednesday, January 7, 1920, at 3 p.m. F. O. Goodman, Liquidator.

METROPOLITAN GLASS WORKS, LTD.—A general meeting of members will be held at 6, Austin Friars, London, E.C. 2, Wednesday, January 7, 1920, at 11 a.m. H. Wates, Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

LOW TEMPERATURE CARBONISATION, LTD., LONDON, E.C.—Registered November 22. Trust deed dated November 7, 1919, for securing £150,000 6 per cent. 1st mort. debenture stock; charged on freeholds in Wednesfield and Barugh, also general charge. *——. December 31, 1918.

MIDLAND REFRACTORIES CO., LTD., SHEFFIELD.—Registered November 24. £1,000 debentures; charged on freehold hereditaments, Bull Bridge Brick Works, Ambergate (Derby), also general charge.* £3,850. July 24, 1919.

MOTTRAM CHROME TANNING CO., LTD., MOTTRAM-IN-LONGDENDALE.—Registered November 19, mortgage for securing all moneys due or to become due, to Lancashire and Yorkshire Bank, Ltd.; charged on freehold hereditaments in Elton, Bury. *Nil. September 19, 1919.

PHOENICIA MINES, LTD., LONDON, E.C.—Registered November 24. £3,000 debentures part of £25,000; general charge. *£45,000. February 18, 1918.

Satisfactions

BARROW HEMATITE STEEL CO., LTD., BARROW-IN-FURNESS.—Satisfaction registered November 28, £364,865; registered November 1, 1904.

BRYANT & MAY, LTD., LONDON, E.—Satisfaction registered November 28, for £500, part of £250,000, registered February 18, 1908.

PENA COPPER MINES, LTD., LONDON, E.C.—Satisfaction registered November 25, for £43,200, balance of £200,000; registered January 10, 1902.

SUN FUEL CO., LTD. (Old Co.), LONDON, E.C.—Satisfaction registered November 24, £10,000; registered January 15, 1918.

County Court Judgment

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

EDWARDS, JAMES M., 311, Fulham Palace Road, chemist £13 0s. 5d. October 30.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane London, W.C.:—

LYSLE EXPORT AND IMPORT CO., LTD, 9, Gamage Buildings, Holborn, E.C.—Manufacturers and dealers in perfumes and toilet and other chemical or medicinal preparations. Nominal Capital, £20,000 in 20,000 shares of £1 each. Directors: J. De Lysle (Managing Director), L. L. Heine. Qualification of Directors, 100 Ordinary shares.

CONLON'S DRUG STORES, LTD., 59, Deardengate, Haslingdon, Lancashire.—Chemists, druggists. Nominal Capital: £700 in 700 shares of £1 each. Directors: J. Conlon, 59, Dearington, Haslingdon; T. Kilgalbon, 100, Wellington Street, Accrington; W. H. Macanley, 131, Blackburn Road, Haslingden. Qualification of Directors, to be voted by company in general meeting.

DEVELOPERS, LTD.—Manufacturers of photographic dry plates, papers and films. Nominal Capital: £10,000 in 10,000 shares of £1 each. Directors to be appointed by subscribers. Remuneration of Directors to be voted by shareholders. Subscriber: E. T. Church, 38, Solon New Road, Clapham, S.W. 4.

RICHMOND LIGHT MANUFACTURING CO., LTD, 90, Cannon Street, E.C. 4.—Manufacturers of incandescent mantles and gas lighters. Nominal Capital: £2,150 in 2,000 Preference shares of £1, and 3,000 Ordinary shares of 1s. Directors: J. J. Fordham, A. Sissons. Qualification of Directors, 1 share.

HERBERT'S (CHEMISTS), LTD., "The Pharmacy," 90, St. Mary Street, Risca, Monmouth.—Chemists and druggists. Nominal Capital: £500 in 500 shares of £1 each. Directors: H. B. Jones, 12, Cross Street, Abergavenny; W. E. Peacock, 90, St. Mary Street, Risca; J. R. Ross, Radcliffe House, Abergavenny. Qualification of Directors, 1 share.

CROSSLAND CHEMICAL REFINING CO., LTD., 20, Southampton Row, High Holborn, W.C.—Chemical refiners and manufacturers and dealers in chemicals of all kinds. Nominal Capital: £250 in 5,000 shares of 1s. Directors to be appointed by subscribers. Qualification of Directors, 100 shares. Remuneration of Directors, £100 each.

T. AND T. LUBRICANTS, LTD.—Manufacturers, refiners and dealers in all kinds of oil. Nominal Capital: £5,000 in 5,000 shares of £1 each. Directors: T. L. M. Meaves, 52A, Conduit Street, W. (Chairman and Managing Director; H. B. Howe, 52A, Conduit Street, W.; G. E. S. Campbell, 16, Hallem Street, W. Qualification of Directors, 50 Ordinary shares

RICHARD E. ENTWISTLE, LTD., 101, Lonsdale Street, Accrington.—Pharmaceutical and dispensing chemists and druggists. Nominal Capital: £2,000 in 2,000 shares of £1 each. Directors: G. Entwistle, 59, Liverpool Road, Southport; W. Entwistle, 74, Fielding Lane, Oswaldtwistle, Accrington. Qualification of Directors, 10 shares.